

Durham E-Theses

Aristotle's account of Speusippus' and Xenocrates' Metaphysical and Epistemological Theories

DE-CESARIS, GIULIA

How to cite:

DE-CESARIS, GIULIA (2020) *Aristotle's account of Speusippus' and Xenocrates' Metaphysical and Epistemological Theories*, Durham theses, Durham University. Available at Durham E-Theses Online: <http://etheses.dur.ac.uk/13441/>

Use policy

The full-text may be used and/or reproduced, and given to third parties in any format or medium, without prior permission or charge, for personal research or study, educational, or not-for-profit purposes provided that:

- a full bibliographic reference is made to the original source
- a [link](#) is made to the metadata record in Durham E-Theses
- the full-text is not changed in any way

The full-text must not be sold in any format or medium without the formal permission of the copyright holders.

Please consult the [full Durham E-Theses policy](#) for further details.

Academic Support Office, Durham University, University Office, Old Elvet, Durham DH1 3HP
e-mail: e-theses.admin@dur.ac.uk Tel: +44 0191 334 6107
<http://etheses.dur.ac.uk>

Giulia De Cesaris

Abstract:

Aristotle's account of Speusippus' and Xenocrates' Metaphysical and Epistemological Theories

This Ph.D. thesis aims at a novel reconstruction of the metaphysical and epistemological theories of the first two successors of Plato, Speusippus and Xenocrates. By advancing a new methodology for the selection and evaluation of the evidence and putting it to the test, this thesis will offer a picture of Speusippus' and Xenocrates' theories as grounded in the privileged testimony of Aristotle.

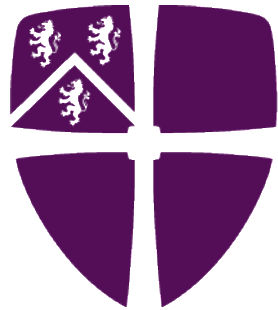
The Early Academy has always been a *riddle* and a challenge for modern scholars. Indeed, for Plato's immediate successors, Speusippus and Xenocrates, the sources at our disposal do not often encourage the project of a coherent reconstruction of their thought. Any exegesis of them faces the following difficulty: on the one hand, the earliest preserved chronological sources approach their doctrines polemically; on the other hand, later *testimonia* are to be found in authors who appropriated and reshaped Early Academic doctrines in their own philosophical frameworks.

Through an in-depth analysis of Aristotelian *testimonia*, this thesis will show that Speusippus' and Xenocrates' doctrines can be better understood in the context of the Academy, and, in particular, with respect to the discussions undertaken with Aristotle. By exposing a set of problems the two philosophers target in order to defend Platonic theories from the inconsistencies detected by Aristotle, Speusippus' and Xenocrates' Platonic inheritance is finally revealed.

Ph.D. Thesis

**Aristotle's Account of Speusippus' and Xenocrates'
Metaphysical and Epistemological Theories**

Department of Classics and Ancient History



**Durham
University**

Giulia De Cesaris

First Supervisor: Dr Phillip S. Horky
Second Supervisor: Prof. George Boys-Stones

Wordcount: 110,519

2019/2020

**Aristotle's Account of Speusippus' and Xenocrates'
Metaphysical and Epistemological Theories**

Giulia De Cesaris

Table of Contents

Acknowledgments

Introduction

i-xxiv

Section I: Speusippus

CHAPTER ONE: Speusippus' philosophy: a general framework

1.1 Aristotle's list of οὐσίαι (fr. 48)	1
1.2 The episodicity of the world (frr. 86; 52)	15
1.3 The rejection of Forms (fr. 77)	26
1.4 Speusippus' ontology: preliminary conclusions	29

CHAPTER TWO: The absence of good in the principles: Speusippus' re-thinking of Plato's theory of Forms

2.1 What is most beautiful and noble does not exist ἐν ἀρχῇ (fr. 53)	32
2.2 Premise (i): what is most beautiful and noble does not exist in the principle/in the beginning (τὸ κάλλιστον καὶ ἄριστον μὴ ἐν ἀρχῇ εἶναι)	35
2.3 Premise (ii): principles (of plants and animals) are causes (τῶν φυτῶν καὶ τῶν ζώων τὰς ἀρχὰς αἰτία μὲν εἶναι)	36
2.4 Premise (iii): Beauty and Completeness are in the things that arise out the principles (τὸ δὲ καλὸν καὶ τέλειον ἐν τοῖς ἐκ τούτων)	38
2.5 The counterexample of the seed	39
2.6 Another discussion on the good (frr. 58, 57)	42
2.7 Why participation?	51

CHAPTER THREE: Mathematical number

3.1 The mathematical realm in Aristotle's testimony (frr. 73; 74; 75; 76; 77)	58
3.2 The generation of numbers: Aristotelian candidates (fr. 83)	62
3.3 The generation of numbers: γένεσις	67
3.4 A brief digression: Speusippus' and Menaechmus on the right appellative for mathematical prepositions (fr. 36)	70

CHAPTER FOUR: The sensibles

4.1 The inquiry into the sensibles: the collection of the ὅμοια (frr. 84; 123-146)	77
4.2 The hunt for knowledge: Proclus' report of Speusippus' epistemology in the <i>In Euclidem</i> (fr. 35)	85
4.2.1 Context and traditional scholarly interpretation	87
4.2.2 The identification of τὰ μὲν (lines 14-19)	93
4.2.3 The identification of τὰ δέ (lines 19-22)	100
4.2.4 The significance of the fragment within Speusippus' epistemology	104

CHAPTER FIVE: The principles

5.1 Methodological clarifications: gathering information about first principles	106
5.2 Problematising the data obtained	110
5.3 Being an element, being a cause	111

Section II: Xenocrates

CHAPTER SIX: The μία φύσις of τὰ μαθηματικά

6.1 Aristotelian testimonia concerning Xenocrates: merging Forms with τὰ μαθηματικά (fr. 27, 26, 29)	120
6.2 Having one nature	128
6.2.1 Interpretative clarifications (fr. 38)	135
6.2.2 What is the comparability between?	138
6.3 The ontological priority of the parts with respect to the whole (fr. 42)	143
6.4 Conclusions	147

CHAPTER SEVEN: The soul

7.1. The definition of the soul: methodological choices for the analysis	149
7.2. Xenocrates' definition of the soul: self-movement as explanatory for living (fr. 86)	150
7.3. Xenocrates' definition of the soul: a middle status (fr. 88-89)	157
7.4. Xenocrates' definition of the soul: Aristotle's testimony in the De Anima (fr. 85 and 112)	160
7.5. Conclusions	170

Conclusions	174
--------------------	-----

Bibliography	177
---------------------	-----

The copyright of this thesis rests with the author. No quotation from it should be published without the author's prior written consent and information derived from it should be acknowledged.

Acknowledgements

The first and greatest thanks I want to express is for my first supervisor, Phillip Horky. I will never be able to thank him enough for the love for research I have developed during these years in Durham: his guidance, support, and passion for his work were crucial for my growth. The (many) hours spent in his office discussing individual fragments and the enthusiasm these conversations produced so as to respond adequately to his critical comments have been invaluable gifts from both professional and personal perspectives.

I owe a secondary thanks to my second supervisor, George Boys-Stones. His sharp comments and challenging questions offered me a totally new perspective on ancient texts and how to interrogate them.

Furthermore, it is impossible to describe how much the whole Department of Classics and Ancient History in Durham, as well as the weekly debates at the Ancient Philosophy Reading Group, contributed to my development as a junior scholar. Individual conversations with members of the Department, and the weekly opportunity to join an exceptional group of scholars commenting on ancient texts, filled me with enthusiasm and motivation.

These years in Durham wouldn't have been the same without Andrea Giannotti, Carlo Cacciatori and Cesare Sinatti: they have been the best support and shelter I could hope for, as well as my home. I owe special thanks also to Federico Petrucci for the philosophical conversations we shared during his stay in Durham as a Post-Doc.

Lastly, I need to thank my parents, Carla and Dario, my brother Filippo and my sister Isabella for the love I receive every day; my lovely Roman Ancient Philosophy Network (Giulia Scalas, Giulio Di Basilio and Roberto Granieri) for the sharing of our views and experiences — receiving unconditional support for our new challenges made me feel less far from home; Pedro, for having dealt with my 'explosions'; my old friends from Rome, and the new ones, for the curiosity and the effort they put everyday into understanding my thoughts about Speusippus and Xenocrates, so far from where they come from.

This Ph.D. thesis has been completed in Durham, funded by a Northern Bridge Doctoral Studentship.

A Nonna Isabella e Nonno Mare

Speusippus and Xenocrates: a riddle yet to be solved

Over the past three years, it has often been complicated to explain to my family and friends why I chose as the focus of my doctoral thesis two philosophers they had hardly heard about: Speusippus and Xenocrates. When they could not remember their names, or they were making fun of how weird these sounded, my approach was consistent: I was not recovering the doctrines of two unknown philosophers from oblivion, but I was restoring the doctrines of the first two successors *of Plato*, and I was doing so by means *of Aristotle*. This apologetic strategy left me quite uncomfortable: in order to justify my interest in the Early Academy and the significance of my choice, I was relying on two names everybody would immediately recognise: Plato and Aristotle. My embarrassment for the answer is motivated by how unfair I believe this strategy is. In fact, the general assumptions motivating this thesis arise precisely out of the opposite beliefs. Namely (i) that we still have much to learn about Platonism as a tradition, and about the discussions taking place inside and outside the Academy – in particular with Aristotle; and (ii) that an effective way to start filling such a gap consists in a novel reconstruction of the doctrines of Speusippus and Xenocrates, the first two scholarchs of the Academy after Plato.

Given these assumptions, this thesis aims at developing a novel picture of Speusippus' and Xenocrates' metaphysical and epistemological doctrines, obtained by advancing a new methodology for the selection and evaluation of the evidence, and putting it to the test.

This objective emerges out of the following considerations, each of which will be dealt with in the course of this introduction:

- Despite the precious pioneering work of Isnardi Parente and Tarán, the picture of Speusippus' and Xenocrates' doctrines one can gather from their collections of fragments¹ is far from unitary and comprehensive. This is probably part of the reason why these collections are usually referred to by scholars only when

¹ Despite Barnes' invitation to 'all good scholars' to 'join pedants like me in fighting' against the loose usage of the word fragment (1983: 308), I will use the term loosely throughout the thesis, whilst dealing with *testimonia* exclusively.

referencing specific fragments but are often underutilised when it comes to providing a more general picture of the doctrines of Early Academic philosophers.

- There is need for a new methodology: previous methodological approaches (never thoroughly accounted for in the collections of the fragments) have often resulted in an inconsistent use of interpretative and methodological criteria.

- There is an insufficient understanding of what Speusippus' and Xenocrates' Platonic legacy amounts to: Speusippus' and Xenocrates' Platonic legacy has been usually understood on the basis of a continuity or discontinuity with Plato's doctrines. However, this approach does not allow us to do justice to individual philosophical reasons for preservation or rejection of Plato's tenets.

The lack of a global picture

When I was first exposed to the material, I realised that, apart from established editions of the fragments published in the 1980s and Dillon's influential monograph on the topic,² new research about the first successors of Plato in the Academy was all but absent. Curiously enough, studies on Middle Platonism and Neoplatonism underwent an opposite trend, and they have been much more prolific in the past years. This silence can be explained by many factors.

One reason for this neglect is surely linked to the complexity of the material at our disposal and a result of the absence of direct evidence; original material about Speusippus' and Xenocrates' doctrines is, in fact, extremely limited.³ Moreover, this difficulty is exacerbated by the fact that evidence about Speusippus' and Xenocrates' doctrines has been transmitted by a surprisingly dichotomous reception.⁴ For both philosophers, the evidence preserved by Aristotle is mainly polemical and often does not address them by name.⁵ This aspect obviously implies that the identification of the passages where Speusippus and Xenocrates are referred to, needs to be brought forward a) by relying on commentators and scholia who identify the philosophers behind Aristotle's claims; and b) through a chain of

² Dillon (2003).

³ For Speusippus, genuine evidence is probably to be limited to the verbatim fragment quoted by ps-Iamblichus in his *Theologoumena* (Ps-Iambl., *Theol. Arithm.* 61ff = fr. 122 IP₁); for Xenocrates, almost all evidence comes from late sources; moreover, the fact that (i) his doctrine is considered akin to that of Plato, and (ii) that Aristotle never mentions him by name, renders the attempt to recover his doctrine particularly difficult.

⁴ This is especially true for Speusippus.

⁵ Speusippus is explicitly referred to by Aristotle twice in the *Metaphysics* (fr. 48 and 53 IP₁) and twice in the *Nicomachean Ethics* (fr. 63 and 108 IP₁, although I will not take these latter fragments into account, as Speusippus' ethical theory does not constitute the focus for this thesis), while Xenocrates is never named. It is also interesting that of the four times Aristotle mentions Speusippus, in two (fr. 63 and 53 IP₁) he is associated with the Pythagoreans.

inferences based on the content of identified passages.⁶ In turn, this complicates the assessment of later evidence, which, on the other hand, is preserved by diverse authors (mainly Middle Platonists and Neoplatonists) whose sources are not always clearly traceable.⁷ In the case of Xenocrates, the assessment of the sources is even more problematic. Not only does Aristotle never mention Xenocrates by name, but he also often associates Xenocrates' and Plato's views: when the two positions are combined with formulas such as 'those who posit the Forms', attempting a distinction between them is further complicated.⁸ In these and similar cases, the most immediate option is to rely on the information preserved by later authors and scholia. What constitutes a problematic aspect of the collections, however, is precisely that the assessment of later evidence sometimes influences the treatment of the material preserved by Aristotle. This is particularly clear when the content of Speusippus' and Xenocrates' doctrines preserved by late authors is not paralleled by Aristotle⁹ but it is used to identify other references in Aristotle's texts. These interpretative decisions obviously have an impact on the overall picture of what Speusippus and Xenocrates one can gather from the collections, although the impact is not always immediately detectable for a reader who is unacquainted with the material. In order to give measure of what this means, I will provide a brief example.

In the *Supplementum Academicum*,¹⁰ Isnardi Parente adds to her collection of Speusippus an Aristotelian passage from the *De Caelo* (3.4, 303a29-b3=fr. 122a IP₂). The passage reads as follows:

[FR. 122a IP₂] Again, even their theory (viz. of the atomists) does not seem to demand an **infinite number of elements**. Bodies, they say, differ on account of differing shapes, but **all shapes are constructed out of pyramids**, rectilinear from rectilinear and the sphere from its eight parts.¹¹

⁶ See Dancy (2016: SEG, *Speusippus*): 'The method followed in the reconstruction of Speusippus' views is a matter of chaining: we start from our two anchor texts, and look for other passages in which the views ascribed to him in them are under discussion. Those passages will sometimes bring in new views; we then ascribe those views to Speusippus, and go looking for passages in which *those* views seem to be alluded to. No one needs to be told how tenuous such chaining is: each link is weak, and compounding probabilities would tell us that a chain of this type is actually weaker than its weakest link. But chaining in that way is all we can do. Fortunately, it results in a fairly coherent picture'. Similarly, for Xenocrates, Dancy (2017, SEG, *Xenocrates*) writes: 'Reconstruction of Xenocrates' views turns, as in the case of Speusippus, on Aristotle, and, again as in the case of Speusippus, this is made the more difficult by Aristotle's frequent failure actually to name Xenocrates when talking about his views. In fact, Aristotle never mentions Xenocrates by name in discussing his metaphysical views'.

⁷ As, for example, determining the ultimate source for Proclus' material in the *In Euclidem* (fr. 35, 36, 37 IP), or the source for Xenocrates' definition of Form as 'paradigmatic cause of whatever is always composed according to nature', (αἰτία παραδειγματική τῶν κατὰ φύσιν αἰεὶ συνεστώτων, fr. 14 IP).

⁸ See, e.g. Xenocrates, fr. 25 IP (=Arist., *Metaph.* Z11 1036b12-7): τῶν τὰς ἰδέας λεγόντων.

⁹ Among many examples, Iamblichus' definition of Speusippus' soul (fr. 96-97 IP₁), or Xenocrates' demonology (fr. 133-147 IP).

¹⁰ Isnardi Parente (1995: 264-265).

¹¹ Fr. 122a IP₂: ἔτι οὐδὲ κατὰ τὴν τούτων ὑπόληψιν δόξειεν ἂν ἄπειρα γίνεσθαι τὰ στοιχεῖα, εἴπερ τὰ μὲν σώματα διαφέρει σχήμασι, τὰ δὲ σχήματα πάντα σύγκειται ἐκ πυραμίδων, τὰ μὲν εὐθύγραμμα ἐξ εὐθυγράμμων, ἡ δὲ σφαῖρα ἐξ ὀκτώ μορίων, transl. Guthrie.

Isnardi Parente is careful in stating that any identification cannot but remain hypothetical, although a) she sees no reason for someone to reject the attribution, provided that the verbatim quotation in ps-Iamblichus' *Theologoumena Arithmeticae* [FR. 122 IP₁], is accepted as authentic as well;¹² and b) she uses the fragment in order to identify principles for Speusippus' soul.¹³ The passage is certainly evocative, but especially so, if taken without consideration of its context. Indeed, the Aristotelian passage affirms that the number of elements cannot be infinite because bodies differ in figure and 'τὰ δὲ σχήματα πάντα σύγκειται ἐκ πυραμίδων', namely, all figures are composed out of pyramids. The reference to Speusippus is identified on the basis of the verbatim fragment in ps-Iamblichus' *Theologoumena* [FR. 122 IP₁] where, according to Isnardi Parente, the pyramid is granted a great prominence. This assumption is, in the first place, disputable. It is true that a long part of the quotation in [FR. 122 IP₁], is devoted to the construction of pyramids (considered as the first solids), but not only do pyramids play a role in Plato's *Timaeus* as well – the text which is quoted the most in the *De Caelo* –,¹⁴ but they occur again in another passage of the *De Caelo*,¹⁵ where both Democritus' and Plato's elements are the target. More strikingly, Isnardi Parente does not mention the context where the passage of the *De Caelo* is preserved, namely within a longer criticism addressed precisely against Democritus and Leucippus. It is true that, in the course of his criticism, Aristotle had compared Democritus' and Leucippus' theory to that of those people who say that everything that exists is numbers, or (originates) out of number (τρόπον γάρ τινα καὶ οὗτοι πάντα τὰ ὄντα ποιοῦσιν ἀριθμοῦς καὶ ἐξ ἀριθμῶν).¹⁶ However, the comparison cannot substantiate the reference to Speusippus: one the one hand, people described as those who believe that all things are numbers can most likely be identified with the Pythagoreans; on the other hand, the only items called 'elements' in Speusippus' system appear to be primary principles, and we have no clue what the details of Speusippus' interpretation of the elements in the *Timaeus* were. Moreover, no extant fragment concerning Speusippus bears witness to an infinity of elements in his system, an attack which seems to be more comprehensible if directed against the atomists (or Plato and, possibly, Xenocrates). Accordingly, although a theory of pyramids is attested by the fragment in ps-Iamblichus, the comparison with the fragment in the *De Caelo* cannot be

¹² Fr. 122 IP₁.

¹³ Although the quotation preserved by ps-Iamblichus (fr. 122 IP₁) can be interpreted within a cosmological framework, nothing in the quotation refers explicitly to the soul, and the only reference to cosmic bodies (viz. not to the soul) appears in the brief resumé preceding the citation, which clearly preserves material re-elaborated in a Neoplatonic context.

¹⁴ See Johansen (2009: 9, n.1). For a more wide-ranging comparison of the *De Caelo* with the *Timaeus* see Solmsen (1960).

¹⁵ *De Caelo*, 3.8.

¹⁶ *De Caelo*, 3.4, 303a8-10.

considered as conclusive, especially insofar as it is part of a broader criticism against Democritus and Leucippus.¹⁷ Although Isnardi Parente does not insist on specifically identifying Speusippus in the passage, her interpretation of it strongly influences her reading of Speusippus' soul, which is presented as less problematic.¹⁸

It is true that such methodological issues and interpretative decisions are probably congenital to any edition of fragmentary material¹⁹ and this should not lead us to immediately suppose the need for a novel account. However, what the collections have mostly failed to provide is an influential picture of the first two scholars of the Academy and of their essential tenets. Although the three collections are, in different ways, invaluable from the perspective of highlighting specific concerns related to specific issues and fragments, nonetheless they do not fulfil the aim of providing an account of Speusippus' and Xenocrates' theories which gives insight about the development of their philosophical commitments. On the one hand, the collections by Isnardi Parente keep the synoptic treatment of Speusippus and Xenocrates extremely compact.²⁰ On the other hand, although Tarán's²¹ introduction to the fragments is fairly long, his presentation of Speusippus' tenets often suffers for his critical approach to Aristotle, who, as Bodéüs rightly underscores in his review,²² is usually taken to misunderstand Speusippus' views. In summary, despite the depiction of Speusippus and Xenocrates as original philosophers holding distinctive claims, the stress on their originality makes them ultimately extraneous to the Platonic tradition or makes their Platonic inheritance difficult to understand, unless one is ready to dig into the commentary on specific passages. It is not an accident, then, that the most influential interpretations of Speusippus and Xenocrates, not only in the 50s and 60s (in particular, Merlan's in 1953, Krämer's in 1964) but also in the early 21st century, when Dillon published

¹⁷ Similar examples can be adduced with respect to Tarán's collection of Speusippus' fragments (e.g. Tarán's identification of Speusippus' primary principles with *number one* and *number two*, the first definite plurality (although this explicitly contradicts Aristotle's text; see fr. 83 IP₁ = *Metaph.*, 1085b5–12, 21–27, where Speusippus plurality is said to be τὸ κατηγορούμενος καθόλου πλήθος) on the basis of a problematic interpretation of fr. 122 IP₁ (= Ps-Iamblichus, *Theologoumena* 61ff), or with respect to Isnardi Parente and Dorandi's (2012) edition of Xenocrates' fragments (see, e.g. the treatment of Aristotle's passages in *Topics* and *Posterior Analytics* (frr. 86–89 IP₂) related to Xenocrates' definition of the soul. The discussion is minimal, and the context of the passages is never analysed in detail so to highlight what Aristotle formally considers wrong of Xenocrates' definition; for other examples, see Gottschalk 1986).

¹⁸ Compare Isnardi Parente (2005: *Introduzione*, 8) 'Torniamo, dopo questo, ai principi dell'anima, e chiediamoci quali essi debbano essere. È chiaro, anzitutto, che Speusippo si riferisce qui all'anima come totalità, e solo secondariamente ad anime individuali. La τετράς è, in essa, il primo principio, per cui il mondo appare come un universo tetradicamente ordinato; ma tale tettrade informa di sé il διαστατόν, il corpo generalmente esteso dell'universo stesso; sì che διάστας può dirsi il principio per mezzo del quale esso è a sua volta ordinato'.

¹⁹ Whatever the nature of this fragmentarity is.

²⁰ Isnardi Parente (1980: 51–63); Isnardi Parente (2012: 3–40), but the doctrinal section goes from p.12 to 33 only.

²¹ Tarán (1981: 3–113).

²² Bodéüs (1984: 118).

his ground-breaking monograph *The Heirs of Plato* (2003), have acknowledged in Speusippus' and Xenocrates' theories proto-Neoplatonic or proto-Middle Platonic accounts. As Dillon's preface perfectly summarises: 'Speusippus and Xenocrates set the agenda for what was to become, over the succeeding centuries, the intellectual tradition which we call Platonism (Xenocrates initiating the mainstream of 'Middle Platonism', Speusippus, with some of his more daring speculations, stimulating certain developments in 'Neopythagoreanism')'. Dillon's account, much less rooted in a detailed analysis of the evidence, but more committed to a philosophical consideration of the significance of Speusippus and Xenocrates' tenets, is better at locating their doctrines in the philosophical and cultural atmosphere of the Academy and presenting their theories as the product of past (and crucial for future) streams of Platonism.

The status quaestionis: the need for a different methodological approach

There is one crucial methodological assumption which has been shared, at different levels, by all scholars who worked on Speusippus and Xenocrates until very recently: Aristotle is not an accurate witness. The lesson taught by Cherniss' revolutionary works²³ has been inherited by scholars to such an extent that sometimes information provided by Aristotle is dismissed without further justification on the assumption that either it cannot fit a Platonic framework or that it must be the result of Aristotle's own criticism. A very fruitful example of this practice is the dismissal of Aristotle's charge of episodicity, whose significance, although testified by Theophrastus, is usually minimised by scholars.²⁴ Aristotle's charge will be dealt with in the course of Section I. However, what is interesting to note here is that the assumption of Aristotle's unreliability ultimately generated a series of scholarly methods for the interpretation of Speusippus and Xenocrates. I will attempt to outline the main methodological approaches scholars produced and give examples of them by presenting their reactions to Aristotle's charge of episodicity.²⁵

²³ Most of all Cherniss (1935) and Cherniss (1945).

²⁴ Trabattoni (2017) is a notable exception.

²⁵ For a more detailed analysis of Speusippus' and Xenocrates' collections previous to 1980, see Isnardi Parente (1980: 51-56), Isnardi Parente (2005: 12-18), Isnardi Parente and Dorandi (2012: 33-40) and Isnardi Parente (1986). One aspect which is missing from my outline is the consideration of Speusippus and Xenocrates as Pythagoreans. I have excluded this aspect from my thesis, but my opinion on the topic is generally in line with Burkert's (1972: 53-82): although Speusippus and Xenocrates probably conceived the roots of their doctrines to be in accordance with or arising out of Pythagorean theories, their doctrines need to be considered as primarily Platonic. So Zhmud (2016). Some of the methodological approaches I will sketch out in the following pages are directed specifically to Speusippus. However, I believe the methodology to be extensible, in line of principle, also with respect to Xenocrates. Lastly, my limited knowledge of German does not allow a detailed treatment of two important studies on Speusippus and Xenocrates, namely, Metry (2002) and Thiel (2006), whose in depth discussion I set as the objective for future studies.

- (i) Given the assumption that Aristotle often distorts the view of the philosophers he presents, material preserved in later authors is considered more reliable than that preserved by Aristotle. This approach, however, does not straightforwardly dismiss the information Aristotle preserves. On the contrary, later texts are usually used in order to shed light on compatible material found in Aristotle so to balance the bitterness of Aristotle's polemic. This approach was originally set out by Merlan²⁶ who, for the first time, identified the material preserved in Chapter 4 of Iamblichus' *De Communi Mathematica Scientia* as referring to Speusippus. The compatibility of Iamblichus' report with claims paralleled by Aristotle's text led Merlan to suppose that Iamblichus probably had Speusippus' material in his library and that, accordingly, he could complement the information Aristotle did not preserve. The same path has been followed by Krämer²⁷ and the Tübingen school²⁸ and, more recently, by Thiel,²⁹ Gerson,³⁰ and Dillon. For Dillon, Iamblichus' testimony (fr. 88 and 72 IP₁) would completely disprove Aristotle's. Speusippus' ontological levels are in fact to be understood as connected on the basis of the similarity (ὁμοιότης) they show with respect to one another. Although Dillon admits the 'embarrassment about the lack of evidence for the mode of connection between levels', nonetheless, he believes that 'a truly episodic universe would be anathema to a Platonist'.³¹ Granted that this approach privileges information (or, at least, interpretations) provided by Middle Platonists or Neoplatonists, the outcome of this method is a proto- Middle Platonic or Neoplatonic depiction of Speusippus and Xenocrates. Their systems have been read as unitarian generative systems produced by primary principles, to be understood as principles of all things. This approach has the invaluable merit of placing both Speusippus and Xenocrates within the Platonic tradition, and to tracing the development of later streams of Platonism as intimately connected to the internal evolution of the Academy. However, the main flaw is that some portion of Aristotle's evidence, which is the closest chronologically to the Academy (and sometimes the most synoptic)³² does not receive an accurate treatment

²⁶ Merlan (1953)

²⁷ Krämer (1964). Think, for example, about his interpretation of the One as super essential (Krämer 1961).

²⁸ See e.g. Gaiser (1998); Reale (2008).

²⁹ Thiel (2006).

³⁰ Gerson (2013) and (2018).

³¹ Dillon (2003: 46, footnote 40).'

³² This is particularly true for Speusippus. In the latest online collection, Isnardi Parente identifies 36 fragments referring to Speusippus from Aristotle's corpus, and 2 from Theophrastus' *Metaphysics*. With respect to Aristotle, Tarán's collection is even more conspicuous: it lists 38 passages from the Aristotelian corpus (and not all of them coincide with those listed by Isnardi Parente). Even by considering non-Aristotelian fragments only, both collections are mainly constituted by fragments related to Aristotle's passages: 41 of the passages included come from commentaries on Aristotle's texts, and if we exclude the 25 fragments preserved by

and is not interpreted in its own sake. It is not an accident, then, that Speusippus' biological fragments preserved by Athenaeus works are not given their due credit, while metaphysics remains the main focus both for Speusippus and Xenocrates.

- (ii) An opposed methodological approach was proposed by Tarán. Tarán's collection is philologically attentive. It deals thoroughly with Aristotle's text and, most of all, it handles the context in which the fragments are preserved. The assumption that Aristotle's testimony is unreliable, ultimately inherited from his teacher Cherniss, is elaborated as a need to get rid of Aristotle's influence when interpreting material concerning Speusippus. Thus, data obtained by the analysis of Aristotle passages is *not* rejected on the basis of later texts,³³ but it is insted dismissed if it is considered as the result of Aristotle's own criticism. It is not by accident, then, that the charge of episodicity is rejected by Tarán on completely different grounds than method (i) namely, on the basis of an internal analysis of Aristotelian fragments. Accordingly, the critique 'of making the whole of nature 'episodic', is', for Tarán, merely 'directed against the plurality of 'material principles''.³⁴ Besides the absence of any translation for the texts included, Tarán's collection suffers from his commitment to eliminate Aristotle's influence from the evidence. The most evident example is that Speusippus' theory of primary principles – attested by Aristotle in various places of his corpus – is ultimately reduced to an invention of Aristotle himself, so that the One and the Plurality should instead be interpreted as merely number one and two.
- (iii) A middle ground between these two opposed approaches, both of which arise out of the assumption that Aristotle is unreliable, can be found in Isnardi Parente's collections.³⁵ Although Aristotle is considered the primary witness for the

Athenaeus on Speusippus' *Similar*s and the Latin transmission of Speusippus' ethical theories (7 fragments in total) operated by Cicero mainly, we are left with very few 'other' fragments (10 in total).

³³ Paragraph 4 of Iamblichus' *DCSM* is excluded from the collection, although reasons for the rejection are explained in a specific section of Tarán's introduction (1981: 86-107). But this approach to Iamblichus' evidence shows the same flaw exposed above: in order to dismiss Iamblichus' account, Tarán wants to demonstrate that his report is incompatible with Aristotle's. But the two reports do have in common, at least, the following points: (i) that the One and the Plurality are principles of mathematical numbers; (ii) that the point is similar to the One, and that a material principle different from plurality but presumably similar to it is the principle of geometrical magnitudes; (iii) the existence of a plurality of principles, each pair peculiar to their ontological level; (iv) the absence of beauty and goodness in the principle; (v) the material principle is not connoted as bad. Moreover, we could also add that, according to a puzzling testimony of Theophrastus, (vi) the good is said by Speusippus to be in the middle (and this may or may not account for the fact that although not specified, good seems to arise at the third level in Iamblichus' testimony).

³⁴ Tarán (1981: 305). Similarly, Isnardi Parente (2005: *Introduzione*, 7) 'le diverse entità o 'sostanze' sono legate fra di loro da un rapporto di analogia; e ciò non piace ad Aristotele, che trova venirsi a formare in tal modo una realtà discontinua'. In a recent paper (2012: 4-5) Dillon aligns with this position: 'If Speusippus had some mechanism or process up his sleeve for linking these levels together, Aristotle is not going to tell us; that would spoil his rhetorical point, which is to ridicule what he elsewhere (N3, 1090b19ff.) terms Speusippus' 'episodic universe'.

³⁵ This is well summarised by Gottschalk's review of Isnardi Parente's first collection of Xenocrates' and Hermodorus' fragments (1986: 81): 'I.P. tried to hold the balance between what one may call, loosely, the Tübingen and American schools of interpretation, with a slight inclination towards the American'.

reconstruction of Speusippus' and Xenocrates' doctrines, the information is counter-balanced or combined with that obtained by other sources. In general, Isnardi Parente's collections prove to be extremely helpful in the analysis of individual fragments; the commentaries of the collections provide accurate accounts of previous interpretations, as well as Isnardi Parente's position on particular issues. However, her collections are much less helpful when it comes to providing a unitarian picture of Speusippus and Xenocrates. This is, on the one hand, motivated by the extensive work Isnardi Parente conducted on both scholars, which is often referred to in her collections but not accurately included in the discussion of the material. On the other hand, her collections do not provide sufficient accounts of the contexts where fragments are preserved, nor of the methodological assumptions used for their interpretations, which, as highlighted in the previous section, are not always clear or coherent throughout the collections. Moreover, by attempting to obtain a general account of the figures of Speusippus and Xenocrates by extrapolating information through a comparison of different comments on similar topics, the picture one obtains is far from coherent. A good example is Isnardi Parente's description of Speusippus' mathematical number, which fluctuates between her acknowledgement that it does not work a cause,³⁶ and her description of it as a transcendent model.³⁷

Given the methodological flaws of all these three approaches and the unsatisfactory outcomes, scholars working on Speusippus and Xenocrates more recently have also acknowledged the need for a new methodology. Newer proposed methodological practices are, in general, more charitable with respect to Aristotle's testimony, and do not start by assuming his essential unreliability. In this respect, they are usually more receptive of Isnardi Parente's middle-ground approach (iii), although they are also responsive to the need for a philosophical consideration of the significance of Speusippus' and Xenocrates' doctrines within the Platonic tradition. There are at least three approaches which deserve to be sketched out:

- (iv) An option which has been advanced by Bénatouïl is to approach the material concerning Speusippus and Xenocrates without aiming for systematicity. Given that the material at our disposal does not allow more than the reconstruction of isolated doctrines, Bénatouïl proposes a topic-related approach,³⁸ which

³⁶ Isnardi Parente (2005: 34)

³⁷ See, e.g. Isnardi Parente (2005: 15).

³⁸ See, e.g. Bénatouïl and El Murr (2010) and Bénatouïl (2017).

concentrates on reports related to specific issues, with a general bottom-up procedure. Rather than reconstructing the details of singular doctrines, the attention is shifted to the philosophical reasons for such postulations and the strategies for their justification.³⁹ As this approach favours a reconstruction of Speusippus' and Xenocrates' doctrines by appeal to parallel texts and sources, the advantage is that such a reconstruction does not perform a progressive detachment from anchor-texts (as the chain of inference does), but always maintains a primary reference to early sources.

- (v) Alternatively, Horky⁴⁰ takes a different methodological path. The evaluation of Speusippus' and Xenocrates' theses is grounded in the consideration of their metaphysics, with a generally top-down directed approach. Given this method, Speusippus and Xenocrates' doctrines are contextualised within the larger framework of their metaphysical commitments. As to the primary texts for his analysis, Horky shares the need to ground his interpretations in sources which are chronologically close to Speusippus and Xenocrates – evidence preserved by Speusippus' and Xenocrates' contemporaries in the Lyceum (Eudemus, Theophrastus) is privileged against later sources, which, when used in order to complement the picture, are never taken as authoritative over the Early Peripatetic material.
- (vi) Lastly, Bechtle proposes a positive interpretation of Neoplatonic evidence, accepting the authenticity of the information preserved by these texts. For, he believes, the parallels these texts shows with respect to Aristotle's testimony are easiest to explain if we assume that they all go back to one author.⁴¹ This approach is more receptive of that of Dillon and the Tübingen school (i), in accounting for the sketches of the theses presented by Aristotle by making constructive use of later interpretations.

In principle, I tend to be more sympathetic to methods (ii), (iv) and (v). I believe that Aristotle's intellectual dishonesty needs to be set aside, and this is why the general methodological assumption for this thesis will be that Aristotle does indeed report genuine traces of Speusippus' and Xenocrates' doctrines. In particular, I share with Tarán (ii) the need to analyse each passage within its context, in the attempt to evaluate separately each

³⁹ E.g., Bénatouïl (2017: 21): 'C'est la raison pour laquelle je vais m'intéresser [...] à la manière dont Speusippe et Xénocrate semblent avoir *élaboré et justifié* les fondements de leur cosmologie, en particulier à partir de celle de Platon. Autrement dit, je vais me demander ce que doivent être les principes du monde de leur point de vue, plutôt que quels sont les principes cosmologiques qu'ils ont adoptés'.

⁴⁰ See, e.g. Horky (2018), where Speusippus' definitional dialectic is explained on the basis of his rejection of the Forms and Horky (2013b).

⁴¹ See, e.g. Bechtle (2010).

piece of information provided by Aristotle and the weight it carries within his arguments. I will also, sometimes, conclude that Aristotle cannot be trusted fully in his conclusions. This, however, will be the result of analyses of Aristotle's terminology and interpretative strategies in other sections of his corpus, with a methodology which may loosely recall the *Platonem ex Platone* exegetical method adopted by Middle Platonists. I will try not to assume that Aristotle does not understand or intentionally misinterprets Speusippus and Xenocrates' theses, but, rather, to show that he combines information related to their doctrines with his own, so as to highlight their internal difficulties. I am also generally sympathetic to method (iv) and (v). I agree that a sufficient account of Speusippus' and Xenocrates' doctrine will face the need to leave some aspects of their theories undetermined and should always aim at an explanation of the philosophical reasons for the postulation of their theses. However, I cannot share the confidence and charitability these approaches concede to later testimonia, and this is the reason why I decided to offer a novel reconstruction of Speusippus' and Xenocrates' theses rooted in an (almost) exclusive consideration of Aristotle's testimony.⁴² The reasons for my scepticism towards information concerning Speusippus and Xenocrates provided by later authors is related to my difficulty to assess their testimonia conclusively. In particular, I believe that any assessment of these texts will be excessively dependent on initial interpretative assumptions. In order to give an example of why, I will provide a brief analysis of the scholarly reception of:

- a fragment preserving William of Moerbeke's translation of Proclus' *Commentary on Plato's Parmenides* [FR. 62 IP₁];
- a passage from Damascius' *Problems and Solutions regarding First Principles*, where Speusippus is cited and criticised for having held that the One is a minimum, or ἐλάχιστον [FR. 61 IP₁];

and

- a passage to be found in an anonymous *Commentary on Plato's Parmenides*, extant in a palimpsest published by Kroll,⁴³ where the same criticism Damascius levels against Speusippus is further related to the smallness (σμικρότητα) and indivisibility (μὴ διαιρετὸν εἶναι) of τὸ ἓν [FR. 60 IP₁].

First, I will highlight a brief résumé of the content of the fragments. Proclus' Latin fragment [FR. 62 IP₁] preserves words of Speusippus related to the One and the Indefinite Dyad. On a maximalist reading, the doctrine preserved is Speusippus' interpretation of Plato's first and

⁴² Throughout the thesis, the fragments I will make use of are (almost exclusively) those recognised by Isnardi Parente (and Tarán, for Speusippus) as authentic. When doing otherwise, I will make use of other passages only to illuminate the discussion, and not to draw direct conclusions.

⁴³ Kroll (1892).

second hypothesis of Plato's *Parmenides* and accounts for an interpretation of the One as super-essential; on a minimalist reading, it contains Speusippus' reasons for positing the Infinite Dyad.

As to Damascius' fragment and the related criticism of Speusippus in the Anonymous Palimpsest, [FRR. 61 and 60 IP₁], they offer a different version of Speusippus' One, according to which the One is a minimum, an ἐλάχιστον.

The three texts have been approached differently by scholars, and the reason why I group them together here is directly related to their scholarly reception. As for the Latin fragment, [FR. 62 IP₁] the scholarly approach it received can be sketched out as follows: on the one hand, scholars like Dillon,⁴⁴ Halfwassen,⁴⁵ and, more recently Gerson,⁴⁶ building on the results of a famous article published by Dodds in 1928,⁴⁷ offer a positivistic reading of the fragment, read as reporting Speusippus' interpretation of the first and second hypotheses of Plato's *Parmenides*. With minor differences, on this account Speusippus is the propounder of a metaphysical/ontological interpretation of the first two hypotheses of Plato's *Parmenides*, which antedates Moderatus' interpretation: the absolute One is in itself and it is above being, while the Dyad, in its interaction with the One, is primarily responsible for the production of beings. On the other hand, in both collections of Speusippus' fragments as well as in Klibansky and Labowsky's edition where the fragment was first presented,⁴⁸ the text receives a very sceptical treatment and it is considered either as a Neopythagorean or Neoplatonic reading of Speusippus' doctrine. Although converging on this conclusion, Tarán and Isnardi Parente diverge conspicuously as to the translation and reading of the Latin text. Indeed, Tarán argues that it is the function of principle which is denied to the (first) One, which is then followed by a Dyad of principles. Differently, Isnardi Parente argues that the One is freed from being, more in line with Neoplatonic readings of Plato's text. Speusippus, then, would be invoked by Proclus in order to legitimise the origin of his Platonic interpretation of the *Parmenides*. After the publication of the collections, the text was the focus of an influential article by Steel, who, in 2002, provided a new Greek retroversion of the text and pointed out the closeness that the retroverted Greek entertains with the formulation of Plato's second hypothesis in the *Parmenides*.⁴⁹ This led Steel to reinforce the sceptical approach to fragment [FR. 62 IP₁], as the author concludes that such

⁴⁴ Dillon (2010).

⁴⁵ Halfwassen (1993).

⁴⁶ Gerson (2016).

⁴⁷ Dodds (1928: 138).

⁴⁸ Klibansky and Labowsky (1953).

⁴⁹ Plato, *Parmenides*, 143a6-8.

a reading reveals a Neopythagorean nuance in Speusippus' theory and is therefore to be dismissed for the reconstruction of Speusippus' original doctrine.

A similar dichotomous interpretation has been reserved to Damascius' passage [FR. 61 IP₁] and to the related criticism found in the *Anonymous Commentary to Plato's Parmenides*, [FR. 61 IP₁], although its scholarly reception has been more univocal. Among scholars with a positivistic attitude toward these texts, we can list Bechtle, who argued that the reading of the One as a *minimum* (ἐλάχιστον) is revealing of Speusippus' positive characterisation of the One as not-being.⁵⁰ On this account, Speusippus' interpretation of the One is clearly compatible with the Latin fragment, which would indeed preserve Speusippus' interpretation of the *Parmenides*. Although the positive use of the evidence, Bechtle's interpretation substantially agrees with that of Tarán's and Isnardi Parente's in taking the fragments, as well as the claim of inferiority and deficiency of Speusippus' smallest One, to be a Neoplatonic elaboration of the criticism Aristotle himself addresses against Speusippus.⁵¹ On this account, Damascius and the anonymous author of the *Commentary* would either be misunderstanding or building on Aristotelian criticism of Speusippus, and complain about Speusippus' One (understood as an elemental or physical minimum). Given this second assumption, the fragment is clearly *not* compatible with the Latin fragment, [FR. 62 IP₁] describing a One which is over-being. Accordingly, Tarán and Isnardi Parente conceive the two *testimonia* as incompatible, and trace them back, respectively, to a misinterpretation of Aristotelian passages (Damascius and the Anonymous) and to a Neopythagorean/Neoplatonic mediation (Proclus' Latin fragment) of an allegedly Speusippean doctrine.

A third option has recently been provided by Brisson,⁵² who, abstaining from interpretation of the gravely damaged lines related to Speusippus in the *Palimpsest* [FR. 61 IP₁], attempted a reconstruction of the doctrine by making use of the three texts (and contexts) together. His analysis concludes that the origin for the criticism related to the smallness of the One is to be found originally in Plotinus.⁵³ Plotinus, in turn, would formulate a critique against an interpretation of the *Parmenides* possibly preserved in an *apocryphon*, and allegedly ascribed to Speusippus. Accordingly, Plotinus' critique against the One conceived as a

⁵⁰ Bechtle (2010a: 55) 'That the nature of the One is only "one," but not "being" in any sense (since this would be in conflict with the One's oneness and utter simplicity), implies that "not-being" may be taken to express the same characteristic as "one." Thus "not-being" does not attribute anything second to the One, like "being," but is identical to the utter simplicity that the One of the first deduction is supposed to have'.

⁵¹ See, e.g. Arist. *Metaph.* M7 1084b23-28.

⁵² Brisson (2010).

⁵³ In particular: Plotinus, *Enneads* VI.9 [6], 1-8

minimum on arithmetical, geometrical and even physical level and directed against a negative interpretation of the One, is then taken up by some other Platonist, possibly Amelius of Porphyry, author of the text preserved in the palimpsest, as well as by Damascius, who criticises it in turn.

What I hope to have shown from this very compact outline is that interpretative decisions to be made on late testimonia concerning Speusippus and Xenocrates are many and multi-layered. However, what I find particularly problematic is (a) that they are also inter-dependent and (b) that their compatibility ultimately depends on strong initial interpretative assumptions.

Indeed, the main issue of disagreement, that, in turn, causes a ramification of different interpretations, can ultimately be acknowledged in what kind of content we think we can get out of Proclus' fragment [FR. 62 IP₁]. Scholars have identified at least four possible readings:

- A sceptical reading: Speusippus is describing an absolute One, which is not even a principle strictly speaking, and which is followed by a pair of opposed principles (the Dyad). This account is preferred by people who believe the information to reach Proclus via a Neopythagorean channel⁵⁴ (and possibly argue for a successive Neoplatonic reading of the information) and who deny any information to be ascribable to the historical Speusippus.
- A minimalistic reading: Speusippus is saying nothing more than the One, taken in itself and without a second co-ordinated principle, cannot generate anything. This reading can be:
 - o Positively maximised: Speusippus is offering the first interpretation of Plato's *Parmenides*, according to which the first One is absolute and over-being, and which is later taken up by other Neoplatonists. On this account, we need to antedate the first 'Neoplatonic' interpretations of the *Parmenides* to the Early Academy, long before Moderatus.
 - o Or, it can be sceptically maximised: the interpretation is clearly transmitting Neoplatonic material,⁵⁵ and, once again, its content cannot be projected onto Speusippus.

⁵⁴ E.g., Tarán (2001), who believes Proclus' immediate source to be a Neoplatonist.

⁵⁵ E.g., Isnardi Parente (1984), who argues for a Neopythagorean transmission.

As a consequence of what reading we will pick, we will determine whether Proclus' passage is compatible or incompatible with the criticism formulated by Damascius and the anonymous *Palimpsest*. If we choose a compatible option, then we may say that Damascius offers a negative reading of the positive one proposed by Proclus (i.e. the One is read as an ἐλάχιστον because it is not yet being, but that out of which being arises). Differently, if we opt for an incompatible reading, then we may read Damascius' and the *Anonymous Palimpsest*'s critiques as arising out of Aristotle's own criticism against Speusippus. Still, if we opt for incompatible readings of the fragments, we would probably need to justify why such incompatible readings all come from texts related to the interpretation of Plato's *Parmenides* and quote Speusippus by name.

Given the number of interpretative assumptions to be made on these texts, I believe that, at least as a first stage of analysis, an interpretation of Speusippus' and Xenocrates' doctrines which relies exclusively on Aristotle's testimony is required. This decision is related not only to the chronological proximity of Aristotle to the first scholars of the Academy. Indeed, it is also fundamental in view of a contextualisation of Speusippus' and Xenocrates' theories which roots their understanding in the discussions taking place within and outside the Academy, and which feature Aristotle as the crucial interlocutor.

Thus, the main projected outcome of this thesis will be to show a) that a *fil rouge* of such discussions can be identified through the lines of Aristotle's criticism against Speusippus and Xenocrates; and b) that such a criticism exposes, specifically, Speusippus' and Xenocrates' philosophical reasons for their tenets. In order to accomplish this purpose, it will be impossible to discuss each fragment by comparing it to each and every singular scholarly position which has been offered. This is for a very simple reason. As I hope to have underlined, each and every one of the accounts discussed has been advanced according to different methodological choices as well as purposes. In this respect, every discussion of individual fragments is incapsulated within a broader framework of references and justified or grounded into previously established assumptions which influence the arrangement of the fragments themselves. To question one of these claims, usually implies questioning the methodology as a whole, as well as peculiar assumptions it is based on.

Given this framework, through the application of a new methodology, this thesis aims to provide a novel picture of the Academy under Speusippus' and Xenocrates' direction, and of the significance of the critical impulse Aristotle provided for the development of their systems. If an appeal to later authors might be considered necessary in order to complement

topics Aristotle makes no mention of (as, e.g. the soul for Speusippus), we must be aware that such an appeal is potentially very misleading at the same time, precisely because it offers no stable ground for their assessment.

A novel understanding of Speusippus' and Xenocrates' Platonic inheritance

And after Plato Speusippus, the son of Plato's sister Potone,
succeeded to the School, then Xenocrates, and afterwards Polemon.
And these, it is said, began from his own hearth at once
to undo the teaching of Plato,
distorting what had been clear to the master
by introducing foreign doctrines,
so that you might expect the power of those marvellous dialogues
to be extinguished at no distant time,
and the transmission of the doctrines
to come to an end at once on the founder's death.⁵⁶

Before approaching the analysis of Speusippus' and Xenocrates' fragments, one last aspect stands in need of justification: why is a new consideration of Speusippus' and Xenocrates' Platonic inheritance needed?

The reason can be exemplified by Eusebius' harsh judgement about the successors of Plato, here reported in *esergo*. For what motivates Eusebius' comment is precisely an evaluation of Speusippus and Xenocrates which is based on their doctrinal continuity or discontinuity with respect to Plato. What is more striking is that Eusebius' judgement about the first successors of Plato in the school still reflects the attitude embraced by most modern scholars.⁵⁷ Indeed, the modern reception of Speusippus' and Xenocrates' theories is mainly through two opposed approaches:

- a) By maximising the notion of **continuity** between the doctrines of Plato, those of his successors and of later streams of Platonism. This approach has been brought forward in different ways. On the one hand, Platonism has been identified in a set of positions which are shared among all Platonists (see, e.g. Gerson 2013);⁵⁸ on the other hand, the continuity between Plato and the Platonic tradition has been

⁵⁶ Euseb., *Pr. ev.*, XIV, 13-14, transl. Gifford (1903).

⁵⁷ See, e.g. Tarán's (1981: 21) comment about Speusippus' conception of mathematical objects: 'To begin with, it appears that *he remained enough of a Platonist* to think that the objects of knowledge must be eternal and unchangeable entities', or the comment expressed by Field and Hornblower (2016) in the *Oxford Classical Dictionary* entry on Xenocrates: 'His philosophical contributions, so far as we can reconstruct them from the scanty evidence, were less impressive. He seems, in general, *to have attempted to reproduce Plato's thought in a stereotyped and formalized system*, though on one or two points he probably preserved the correct tradition of interpretation as against Aristotle' (my emphasis).

⁵⁸ Gerson (2013: 10): 'The elements of UP according to my hypothesis are antimaterialism, antimechanism, antinomialism, antirelativism, and antiskepticism'.

considered rooted originally in Plato's unwritten doctrines (see, e.g. the Tübingen school).

b) By maximising the notion of **discontinuity** between the doctrines of Plato and those of his successors. On this account, Speusippus' and Xenocrates' Platonic inheritance has been intertwined with that of later streams of Platonism. Speusippus' doctrines have been interpreted as anticipating Neo-Platonism (see e.g. Krämer 1964; Bechtle 2010; Dillon 2010) and Xenocrates' as foreshadowing Middle Platonism (see, e.g. Dillon 2003). This way, their Platonic inheritance has been projected into the future rather than in the past.

Both of these interpretative approaches are unsatisfactory because they are reductive. This reductiveness does not account for (i) the historical originality of Early Academic doctrines in their context of origin; (ii) the dialectical relationship they entertain with other thinkers (first of all, Aristotle); (iii) how the doctrinal filiation with Plato should be understood; and (iv) the specific and individual philosophical reasons which determined a doctrinal discontinuity but do not imply a rejection of Plato's legacy.

Within the framework I provide for this thesis, I hope to show that Speusippus' and Xenocrates' doctrines did not sever their intimate connection with Plato at all. On the contrary: their doctrinal derailments or recoveries can be better understood as the attempt, from genuine Platonists, to defend at all costs their Platonic inheritance from Aristotle's attacks.

Note of clarification

Exclusion of other early witnesses

Given the methodological warnings expressed with respect to the evidence preserved by late authors, one question yet remains to be answered: what motivates the exclusion of other early and contemporary witnesses, most notably Theophrastus?

The exclusion⁵⁹ can be motivated by at least two reasons.

One reason is directly related to the content and weight that Theophrastus' passages preserve for the reconstruction of Speusippus' and Xenocrates' philosophy. First of all, Theophrastus' evidence concerning Speusippus and Xenocrates is extremely scant and amounts to two passages only: fr. 71 and 87 IP.⁶⁰

⁵⁹ Theophrastus' passages are referred to in footnotes, but not directly analysed in the text.

⁶⁰ = fr. 59 and 83 Tarán. Fr. 87 IP Speusippus corresponds to fr. 20 IP Xenocrates.

As for fr. 87 IP, it preserves content which can arguably fit either an ethical or cosmological theory.⁶¹ Given that both Tarán and Isnardi Parente adopt an ethical interpretation of the passage, I left aside the fragment as not relevant to the focus of this thesis.

The second mention, fr. 71 IP Speusippus (= fr. 20 Xenocrates), features Speusippus and Xenocrates together and is included both in the collection of Speusippus' fragments and in that of Xenocrates'. In the introductory lines, Theophrastus makes a general consideration addressed to a large group of people.⁶² After having described the generation of numbers, solids and bodies, these people left aside a detailed treatment of everything else and did not explain how these processes took place precisely. Then, Theophrastus comments that so did Speusippus, but not Xenocrates, who is said to have placed everything around the cosmos. Lastly, Theophrastus provides a list of items populating Xenocrates' world.

The passage has been the object of a lively dispute among scholars. In particular: it has been discussed (i) whether the introductory lines can be read as a misinterpretation of Plato's doctrine;⁶³ (ii) whether the second portion of text, which presents textual problems, is to be included in the text or not; and (iii) if the list of items populating Xenocrates' world can be reconciled with other testimonia.⁶⁴ As to Speusippus, the core information we are preserved with is that he appeared not to have explained generative processes in detail.⁶⁵ This complaint is replicated by Aristotle, especially with respect to the production of numbers, and this aspect is accounted for throughout the thesis. Accordingly, I did not consider the analysis of Theophrastus' fragment as adding much information.

As to the content related to Xenocrates and specifically addressing the items populating his world, the passage preserves information which are at odds with Aristotle's claim that Xenocrates posited one nature for Forms and Numbers. This leads to a second reason for the exclusion of the evidence preserved by Theophrastus, namely Theophrastus' complex doctrinal relationship with Aristotle. Although, fr. 71 IP appears to replicate the same

⁶¹ See Tarán (1981: 444-449) and Isnardi Parente (1980: 294-297).

⁶² Theophrastus speaks of 'many' (οἱ πολλοί) as well as of 'those who posited the One and the Indefinite Dyad' (καθάπερ καὶ οἱ τὸ ἓν καὶ τὴν ἀόριστον δυάδα ποιοῦντες).

⁶³ As Cherniss, among others, concludes (1945: 25-59). Tarán is more careful about the identification (1981: 381-382).

⁶⁴ In particular, with Aristotle's claim that Forms and Numbers are merged together (Frr. 26-28 IP Xenocrates) and Sextus Empiricus' tripartite division of the items populating Xenocrates' world (F2 IP). On this issue, see Horky (2013b), who provides an analysis of the above-mentioned passages in parallel and offers an explanation for their correspondence.

⁶⁵ See Tarán (1981: 382): 'The comparison between him and the philosophers of 6a23-b5 is limited then to the fact that also he failed to discuss in detail the derivation of things from the principles'.

theoretical framework employed by Aristotle in his criticism of Speusippus' episodic system, Theophrastus' doctrinal relationship with Aristotle cannot be reduced to a simple repetition of Aristotle's doctrines. Accordingly, an accurate analysis of the passage would have required a thorough study of the relationship that Theophrastus' *Metaphysics* entertain with Aristotle's, of its peculiar agenda and objectives, an analysis which would have let me astray from the present purpose.

Similar considerations can be extended to the evidence preserved by the commentators of Aristotle's text and other middle authors (for which the sources and the processes of transmission of the material are often not easily determinable conclusively), which, accordingly, have been excluded from the present analysis.

Inclusion of other authors: Athenaeus and Proclus

Section 4.1 provides an analysis of the fragments preserved by Athenaeus and related to Speusippus' inquiry into the *Similars*. Although this decision may appear to conflict with my methodological assumptions, the inclusion of the material can be motivated by the following reasons. Aristotle's testimonia concerning Speusippus' inquiry into the sensibles is limited to one passage only,⁶⁶ analysed at the beginning of Chapter 4. As the material at our disposal is extremely limited and compact, I believed it was necessary, in order to strengthen the validity of the results obtained, to take into account additional material. And since Athenaeus is the author preserving most of the information on the topic, I included his fragments as part of my analysis. However, the aim of section 4.1 *is not* to obtain new information about Speusippus' enquiry into the sensibles, but, differently, to show that (i) *an analysis of Athenaeus' fragments does not work against my hypothesis* of an episodic system for Speusippus; and that (ii) *the fragments preserved by Athenaeus do not support consistently the hypothesis of a link between Speusippus' ontological levels*, usually individuated by scholars in the notion of ὁμοιότης.

A similar comment can be extended to sections 4.2 to 4.2.4, entirely dedicated to an analysis of a fragment preserved by Proclus. Such sections are meant as a test of the results obtained in the previous chapters against a source which appears to be independent of Aristotle.⁶⁷ Accordingly, the aim of the sections *is not* to obtain new information about Speusippus, but *to show that Proclus's passage is compatible with the conclusions obtained*.

⁶⁶ Fr 80 IP.

⁶⁷ At least insofar as the material appears to go back either to Phillip of Opus via Posidonius and Geminus, or to Heraclides Ponticus.

Aristotelian testimonia excluded from consideration

The thesis examines Aristotelian fragments which are identified as authentic by the two collections of Isnardi Parente and Tarán.⁶⁸ Given the focus on Aristotelian testimonia concerning epistemological and metaphysical theories, ethical fragments,⁶⁹ fragments listed as belonging to authentic works,⁷⁰ and fragments dealing with Speusippus' and Xenocrates' exegesis of the *Timaeus*,⁷¹ have been excluded from consideration. This thesis is not a critical edition of Aristotle's fragments concerning Speusippus and Xenocrates' theories and does not set completeness as its aim. A sufficient account of all Aristotelian passages preserving information about Speusippus' and Xenocrates' epistemology and metaphysics, in fact, would have required a more generous treatment than what is generally allowed for a Ph.D. thesis. However, specific justification for having left aside potentially relevant testimonia is provided below:

Speusippus

- Fr. 38 IP (=Arist. *A.Po.*, II13, 97a6ff; = fr. 63a Tarán) preserves polemical evidence related to a thesis which claims that a thing can be known only if its relationships to all other things are known (the information that the thesis is Speusippean is supplied by commentators of the passage (see ffr. 39-47 IP), who unanimously point at Speusippus as the author). The content of the passage is arguably related to epistemology, and, given the focus of my thesis, may be taken to require specific attention. However, the passage has been object of a lively dispute among scholars,⁷² who seriously disagree as to how the argument presented by Aristotle should be understood. More specifically, the disagreement includes (i) the order of the claims and their reciprocal philosophical cogency; and (ii) what claims are actually endorsed by Speusippus and what are to be understood as Aristotle's counterarguments. Given the conspicuous dose of controversies at stake and the impossibility to supply other

⁶⁸ Accordingly, dubious references (as frr. *68 IP (=Arist. *Metaph.* I3, 1054a20ff), *81 (= Arist. *Metaph.* N3, 1090b5ff = fr. 50 Tarán), and *98 IP (=Arist. *De an.* I2, 404b 18ff) and *146a IP (=Arist. *De part. Anim.* I2, 624b4-20 = fr. 67 Tarán)), and/or Speusippean fragments which are not acknowledged as authentic by both Isnardi Parente and Tarán (frr. 68 IP and 110 IP) will be excluded from consideration.

⁶⁹ Speusippus: fr. 108 (=Arist. *EN*, VII 13, 1153b1ff = fr. 80a Tarán); 109 (=Arist. *EN*, X 2, 1173a6ff = fr. 81a Tarán); 110 IP (=Arist. *Metaph.* I 6, 1056a30ff). Xenocrates: fr. 154 (Arist. *Top.* II6, 112a32-37) and 158 (Arist. *Top.* VIII1, 152a 5-12; 25-30) IP₁. I considered also frr. 3 IP₁ (=Arist. *Top.* VI3, 141a), dealing with Xenocrates' definition of wisdom, and 13 IP₁ (=Arist. *EE* I8, 1218a 24-8), where Aristotle reports that for Xenocrates the One is considered to be (the) Good because numbers yield to it, to belong to the ethical section.

⁷⁰ Speusippus: frr. 118-122 (= frr. 3, 4, 5a, 5b, 28 Tarán); 147-159 IP (= frr. 1a, 1b, 2, 83, 87b, 86 Tarán; frr. 149, 150, 153, 156-159 IP are discussed but not included as fragments by Tarán); Xenocrates: frr. 177-186 IP.

⁷¹ Fr. 94 IP (=Arist. *De cael.* I 10, 279b32-290a 3, 280a 7-8 = Xenocrates fr. 73 IP).

⁷² Just to mention some: Barnes (1994: 245-247); Falcon (2000); Dillon (2003: 79-80), Burnyeat (1990 *ad loc.*). For more detailed information about the scholarly dispute, see, *infra*, footnotes 361 and 363.

Aristotelian material on the topic, an appropriate assessment of the passage would have required inclusion of passages preserved by other witnesses (the Anonymous commentator of Aristotle's *Posterior Analytics*, Iohannes Philoponus; Eustratius; Simplicius). However, this practice would have contravened the methodological principles of this thesis and, accordingly, I decided to postpone the discussion to a different context.

- Fr. 85 IP (=Arist. *Top.*, I 18, 108b23ff = fr. 65 Tarán) also discusses issues related to definition and specifically mentions a theory of similarity which both Isnardi Parente and Tarán accept as a reference to Speusippus. However, the passage is also mentioned in Huffman's collection of Archytas' fragments,⁷³ where it is analysed in close connection with fr. A22 Huffman and acknowledged as a reference to Archytas. In both fr. 22A Huffman, where Archytas is explicitly mentioned, and fr. 85 IP, the example of stillness in the air (σννεμία) occurs. Although Huffman realises the difference between the two contexts, he nonetheless takes both passages to refer to Archytas. Accordingly, as the attribution is not confirmed conclusively, I decided to consider the fragment as dubious and excluded the passage from the present analysis.
- Fr. 63 IP (=Arist. *EN* I 4, 1096b5ff) states that Speusippus followed the Pythagoreans in placing the One in the series of the goods. I excluded the passage from those considered because I believe the discussion to belong to an ethical context. If otherwise, the passage would be incompatible with other (well attested) metaphysical fragments preserved by Aristotle, where it is said that Speusippus refused to characterise the One as (the) good. A similar consideration can be extended to fr. 67 IP (=Arist. *A.Po* II 6, 92a20ff = fr. 82 Tarán) which has been identified as Speusippean and related to ethical doctrines by Cherniss.⁷⁴
- Frr. 64 (=Arist. *Metaph.* N4, 1091b30ff = fr. 45a Tarán), 66 (=Arist. *Metaph.* Λ 10, 1075a31ff = fr. 46a Tarán), 82 (=Arist. *Metaph.* N5, 1092a35ff = fr. 38 Tarán), 82a (=Arist. *Metaph.* M1, 1087b6 = fr. 39 Tarán) IP, preserve information related to the names Academic authors attributed to primary principles, and to some of their characteristics, e.g. divisibility/indivisibility, etc. (frr. 64 and 66 – dealing with the thesis that if the One were to be characterised as 'good', the second principle would consequently be characterised as 'bad' – are briefly referred to in the thesis but do not receive separate consideration). The reason for excluding this group of passages from the thesis is related to the context they are preserved in. In the passages Platonists are grouped together and an adequate distinction and attribution of their theses is not

⁷³ Huffman (2005: 499-503).

⁷⁴ Cherniss (1945: 36-38).

always achievable. To give an example, passages where Speusippus is identified by scholars provide at least two different formulations of his second principle ($\pi\lambda\eta\theta\omicron\varsigma$ in fr. 64, 82 and 82a IP (which is less than one line and only reports the alleged Speusippean formulation); $\tau\alpha\ \pi\omicron\lambda\lambda\acute{\alpha}$ in fr. 66), which appear to depend on the contexts of Aristotle's refutations.

- Fr. 92 IP (=Arist. *Metaph.* N5, 1092a17ff = fr. 53 Tarán), where Aristotle charges Speusippus for having generated place together with mathematical objects. The fragment is the only passage where Aristotle makes a reference to place with respect to Speusippus' doctrine. Considering that an adequate assessment of the passage would have required consideration of Aristotle's criticism of Plato's receptacle (as, e.g. in *Phys.* 209b16-17; 212a1-2), where Aristotle accuses Plato of having confused matter with space, I postponed the analysis of the fragment to a different context.

Xenocrates

- Fr. 25 IP (=Arist. *Metaph.* Z11, 1036b 12-7) preserves two different positions concerning the line, which have been attributed by scholars to Plato and Xenocrates respectively. However, scholars strongly disagree as to (i) the right grammatical construction of the sentence; (ii) its translation; (iii) the web of references that, in turn, justify the identification of Plato or Xenocrates behind the Aristotelian sentences.⁷⁵ Given the many decisive elements that an appropriate evaluation of the text would have required for the assessment, the passage is not fully discussed in the text, but only referred to in the footnotes.
- Fr. 41 IP (=Arist. *Metaph.* B 3, 998b30- 999a14) addresses the issue of the relationship between genus and species in Xenocrates' system. Whether the reference in the text addresses Xenocrates or not, and what portion of text should be understood as actually reporting his thesis is a hotly debated issue.⁷⁶ Accordingly, I considered the reference as dubious, and postponed its discussion to a different context.
- Fr. 44 (Arist. *Phys.* VI2, 233b 15-7) preserves a general comment Aristotle makes about the impossibility for indivisible magnitudes of any kind to exist; fr. 46 IP (Arist. *Phys.* I3 187a1-3) reports of an argument ' $\acute{\epsilon}\kappa\ \tau\eta\varsigma\ \delta\iota\chi\omicron\tau\omicron\mu\acute{\iota}\alpha\varsigma$ ' according to which there are indivisible magnitudes. I excluded these passages from my analysis because the

⁷⁵ See, e.g. Ross (1924: 201-202), Cherniss (1945: 567ff), Saffrey (1971: 32ff), Cherniss (1971: 44 ff), Isnardi Parente (2012: 263-264).

⁷⁶ More information on scholarly disagreements can be found in Berti (2009: 128-129).

former only reports a very general claim which is not further qualified by Aristotle, while the latter is not clearly referred to Xenocrates.⁷⁷

All other fragments, if not fully discussed in the text are at least referred to in the footnotes.

Outline of the thesis

My thesis will be divided into two sections: the first section (Chapters 1-5) will focus on Speusippus, and the second section (Chapters 6-7) will focus on Xenocrates.

The overall goal of the first section is to expose Speusippus' rationale for an episodic system. To this aim, Chapter 1 will analyse the fragments which provide general information about the structure of Speusippus' world and the items populating it. Such an analysis will provide (a) the general framework for my interpretation of Speusippus; and (b) a justification for the thematic arrangement of the following chapters. Chapter 2 will be dedicated to an investigation of Speusippus' claim about the absence of Good in the principles. I will argue that the claim can be understood as a direct response to the Platonic problem of participation, and as an attempt to fix Plato's difficulties by means of a first intervention in the system; sensibles will not need to rely onto causal or paradigmatic causes for their understanding, but will require a different and separate kind of enquiry. Chapter 3 will be dedicated to the analysis of mathematical objects, so as to show that the mathematical realm presents a second intervention into the system. I will argue that Speusippus' decision to avoid characterising mathematical objects as paradigmatic and efficient causes aims to preserve the possibility that mathematical and geometrical practices can be differentiated and are independent from other kinds of enquiry. Chapter 4 will take into account Speusippus' inquiry into the sensibles. In order to offer a broader perspective of Speusippus' epistemology, the last section of Chapter 4 will examine a passage of Proclus' *Commentary on the First Book of Euclid Elements*. This last section is meant to test the depiction of Speusippus I have provided in the previous chapters against a source which appears to be independent from Aristotle. Lastly, Chapter 5 will attempt to summarise the information about primary principles obtained throughout the thesis to explain why they are conceived of as unqualified.

Section II, on Xenocrates, will show that Aristotle's criticism of the episodicity of Speusippus' world is well understood by Xenocrates. I will argue that Xenocrates accounts for the ontological continuity of his system by means of structural similarities between the

⁷⁷ See Isnardi Parente (2012: 275-276). In the revised collection of Xenocrates' fragments, no asterisks are used in order to mark dubious references. However, where Isnardi Parente is not sure about the attribution is made clear in the commentary.

items populating it. To this purpose, the section will be organised into two chapters: Chapter 6 will investigate the significance and meaning of the formula $\mu\acute{\alpha}\ \phi\acute{\upsilon}\sigma\iota\varsigma$ employed by Aristotle when explaining Xenocrates' conflation of numbers with Forms. An analysis of Aristotle's formula will reveal that a) it can be understood as including not only numbers, but geometrical objects as well; and b) that the $\mu\acute{\alpha}\ \phi\acute{\upsilon}\sigma\iota\varsigma$ of mathematical and geometrical objects with Forms can be further illuminated by Xenocrates' claim that parts are prior to their wholes. Indeed, Form-Numbers and what I will call 'Ideal-Geometricals' do share a similar ontological structure, aimed at accounting for their continuity as well as for a gradual deployment of reality. Within the perspective of a continuous consideration of the world, Chapter 7 will investigate Xenocrates' definition of the soul as a 'self-moving number'. Through an analysis of Aristotle's references to Xenocrates' definition, I will argue that in order for sensible objects to be explained in continuity with the rest of the system, a third condition is needed: movement. Additionally, I shall claim that the appeal to the notion of number rather than to geometry in the definition of the soul is meant to avoid a physical consideration of the soul. The overall goal of the section is to show that Xenocrates' main purpose is to maintain an ontological continuity in his system. For the gradual deployment of his reality is explained by adding specific conditions at each ontological level. In this respect, Xenocrates (i) shows a profound understanding of Aristotle's criticism against Speusippus' world and (ii) works with shared assumptions of Aristotle himself, as the differentiation of wholes into $\pi\acute{\alpha}\nu$ and $\acute{\omicron}\lambda\omicron\nu$ highlights. The overall picture of the two sections is that of a continuous and fruitful discussion taking place inside the Academy, with Speusippus and Xenocrates effectively engaging with Aristotle's critiques in the attempt to preserve Platonist doctrines which show coherence at a broader level. The central difference between Speusippus and Xenocrates' approaches is to be identified in their respective interests, which determine the arrangement of their worlds. On the one hand, Speusippus' doctrines expose the worry of ensuring and maintaining independent inquiries, and, therefore, are oriented predominantly by epistemological concerns; on the other hand, Xenocrates' system is governed by an ontological commitment. Indeed, the possibility for the soul to know seems to be granted on the basis of an ontologically justified deployment of his ontology, which accounts for the continuity (and differences) of each ontological level on the basis of their similar ontological structures.

Section I: Speusippus

CHAPTER ONE:

SPEUSIPPUS' PHILOSOPHY: A GENERAL FRAMEWORK

In order to begin our investigation of the Aristotelian *testimonia* on Speusippus, it is important, as a first step, to cover some basic issues. Indeed, in any assessment of fragmentary material, the choice of the first fragments to be analysed is obviously crucial, as it works as a predisposition of the following analyses. This chapter is meant to be an analysis of those fragments which preserve an overall presentation of Speusippus' structure of reality and of his philosophical commitments (namely, frs. 48, 86, 52, 77 IP₁) and can therefore provide us with the general coordinates to begin our inquiry. In particular, section 1.1 will deal with Speusippus' structure of the world as described by Aristotle in *Metaphysics* Z2, in the attempt to identify the layers composing Speusippus' structure of reality; section 1.2 will concentrate on how these layers relate to one another and section 1.3 will focus on Speusippus' rejection of the Forms. The choice for this arrangement is motivated by three reasons: first of all, the fragments under analysis in these sections can be considered as somehow isolated and do not require an appeal to other fragments for their understanding. In this respect, dealing with these fragments at the beginning of my inquiry has a clear methodological advantage; they can more easily work as the basis to support an interpretation of Speusippus' theories which does not rely on a circular method, or on strong initial hermeneutical assumptions. Secondly, these fragments preserve crucial information about Speusippus' philosophical commitments *in general*. The arrangement of a discontinuous system, together with the choice to reject the Forms, provides us with compelling evidence about Speusippus' philosophical assumptions and about the overall framework of his theories. Lastly, the selection of these introductory fragments has the advantage of including one of the two extant Aristotelian fragments which actually addresses Speusippus by name.⁷⁸ Accordingly, these assumptions will constitute the foundational points for my enquiry and will serve as general frame for the analysis of more particular issues.

1.1 Aristotle's list of οὐσίαι (fr. 48)

The first requirement for an understanding of Speusippus' theories is to grasp his overall conception of reality. Accordingly, this section is conceived as an introduction to

⁷⁸ My analysis of the second fragment, fr. 53 IP₁, will represent the core of the next Chapter.

Speusippus' ontological commitments, through an analysis of the description Aristotle gives of them in *Metaphysics* Z2. Given this purpose, book Z of the *Metaphysics*, where Aristotle conducts his enquiry about substance,⁷⁹ obviously represents a crucial text. It is in Chapter 2,⁸⁰ in fact, that the first direct mention of Speusippus occurs. The context is that of the introductory chapters of book Z (1-3), where Aristotle reviews the opinions of his predecessors and outlines the fundamental questions about οὐσία which will guide his analysis further. Accordingly, the passage reads as follows:

[FR. 48] ἔτι παρὰ τὰ αἰσθητὰ οἱ μὲν οὐκ οἴονται εἶναι οὐδὲν τοιοῦτον, οἱ δὲ πλείω καὶ μᾶλλον ὄντα ἀίδια, ὥσπερ Πλάτων τὰ τε εἶδη καὶ τὰ μαθηματικὰ δύο οὐσίας, τρίτην δὲ τὴν τῶν αἰσθητῶν σωμάτων οὐσίαν, Σπεύσιππος δὲ καὶ πλείους οὐσίας ἀπὸ τοῦ ἐνὸς ἀρξάμενος, καὶ ἀρχᾶς ἐκάστης οὐσίας, ἄλλην μὲν ἀριθμῶν ἄλλην δὲ μεγεθῶν, ἔπειτα ψυχῆς· καὶ τοῦτον δὴ τὸν τρόπον ἐπεκτείνει τὰς οὐσίας.

Further, some do not think there is anything such as this (viz. substance) beyond sensible things, while some others think there are eternal substances which are more in number and more real, e.g., Plato posited two kinds of substance – the Forms and the objects of mathematics – as well as a third kind, i.e. the substance of sensible bodies. And Speusippus posited still more kinds of substances, beginning with the One, and principles for each kind of substance, one for numbers, another for spatial magnitudes, and then another for soul; and in this way, he multiplies the kinds of substances.⁸¹

This fragment preserves crucial evidence related to Speusippus' ontological commitments. As is customary, before arranging his own discussion of the topic, Aristotle starts the enquiry by examining the various opinions of his predecessors: it is in this context that Plato and Speusippus are mentioned. Leaving aside for a moment the obvious difficulties that the subject of Aristotle's enquiry itself raises, not to mention the terminology of substance used by Aristotle throughout the text, the passage preserves important information about Speusippus' structure and organization of reality: Speusippus appears to have posited even more οὐσίαι than Plato did and to have established different kinds of principles for each of them. If the content appears to be fairly clear at a first glance, it is worth examining the broader context of Z2 in which it is placed, so to be sure to understand Speusippus' position as in relation to those of Plato and Aristotle.

⁷⁹ As to the aim of book Z specifically, interpreters disagree. In particular, Menn (2011) has recently questioned the answer provided by both Burnyeat (2001) and Frede and Patzig's commentary (1988), which relied on the assumption that the discussion of Z is arranged according to an investigation of the criteria and candidates for substances. By contrast, Menn argues that Z offers a critical investigation περὶ ἀρχῶν. As he explains elsewhere (unpublished, IIa: 9): 'Z is looking for ἀρχαί and it is looking for the ἀρχαί as one particular kind of cause, namely as a cause of being in one particular sense'.

⁸⁰ It is obviously impossible, in this context, to cover extensively the scholarly debate related to Aristotle's conception of οὐσία in book Z of *Metaphysics* and how it relates to other Aristotelian texts. For a general overview of book Z, see Frede and Patzig (1988), Bostock (1994), Burnyeat (2001) and Lewis (2013). For a critical overview of scholarly positions on the arrangement of book Z of the *Metaphysics*, see Menn (2011).

⁸¹ Arist., *Metaph.* Z2, 1028b18-24, transl. Ross modified.

At the beginning of Z2,⁸² Aristotle says that ‘substance is thought to belong most obviously to bodies’.⁸³ Accordingly, he lists candidates generally thought to be substances: animals, plants and their parts; natural elements and things that are composed by these; the heaven and its parts. Nonetheless, a comprehensive analysis still needs to address whether these things alone are substances; if all of them are, or only some; and if there are more things that need to be added to the list.⁸⁴ Indeed, some philosophers are said to believe that the ‘limits of body, i.e. surface, line, point and unit’⁸⁵ are substances as well, and more so than the body or the solid. It is at this point that the passage begins, and that problems arise. Aristotle states:

ἔτι παρὰ τὰ αἰσθητὰ οἱ μὲν οὐκ οἶονται εἶναι οὐδὲν τοιοῦτον, οἱ δὲ πλείω καὶ μᾶλλον ὄντα αἰδία [...].

Further, some do not think there is anything substantial beyond sensible things, but others think there are eternal substances which are more in number and are more real.⁸⁶

This first sentence presents two groups of people: (a) οἱ μὲν and (b) οἱ δέ. The first group (a) seems to be clearly defined: those people who believe that, beyond the sensibles, no substances can be found. On the contrary, the second group (b), which includes Plato and Speusippus, is not as clearly delineated, as there are some grammatical ambiguities related to μᾶλλον, placed in an equivocal position. Indeed, the comparative adverb can be either taken to refer to ὄντα (μᾶλλον ὄντα) or considered together with πλείω (πλείω καὶ μᾶλλον, ὄντα αἰδία). Accordingly, Aristotle might be saying that:

(b.1): ‘but some others (believe that there are) eternal substances which are greater in number and are more real’.⁸⁷

⁸² Although the scholarly debate about book Z is very lively, chapter 2 of book Z is usually overlooked by scholars, who often treat the chapter as a mere report of previous views on substance, aimed at introducing the possibility of the existence of non-sensible substances. Indeed, references to Z2 in scholarly debates are almost restricted to pointing out the two different questions asked by sections Z1-3, namely, with Menn’s words (unpublished, IIa: 9): (a) ‘what οὐσίαι are there?’, (b) ‘what is the οὐσία of a given thing’. Moreover, as it is Z3 that mainly sets the agenda for the rest of book Z, scholarly accounts generally overpass Z2 quickly. As an example, except for Frede and Patzig’s commentary (1988: 26-32) and Menn’s chapters (unpublished, IIa), which fairly discuss the section, Burnyeat (2001: 13-14) and Bostock (1994: 69-70) dedicate to it only two pages of their books, while Lewis only a few lines (2013: 16).

⁸³ Arist., *Metaph.* Z2 1028b8-9 ‘δοκεῖ δ’ ἡ οὐσία ὑπάρχειν φανερώτατα μὲν τοῖς σώμασιν’, transl. Ross.

⁸⁴ Ivi, 1028b13-14.

⁸⁵ Ivi, 1028b16-17, transl. Ross.

⁸⁶ Ivi, 1028b18-19, transl. Ross slightly modified.

⁸⁷ Following Ross’ translation. Ross (1924: 164) offers another option for the translation which is closer to b.2 (‘entities more in number and more truly substances, being eternal’) but concludes this one is preferable. Tricot’s French translation of the *Metaphysics* (1953: 351) goes in the same direction, as well as Isnardi Parente’s (1980: 153-154) and Reale’s (1993: 291), although Reale alone clarifies the second term of

(b.2): ‘while others think that there are several [kinds of οὐσία beyond the sensibles], and that they are more so [i.e. are οὐσίαι to a higher degree than the sensibles], since they are eternal’.⁸⁸

These options present two main interpretive approaches to be discussed here. On the one hand, translation (b.1) relies on a substantivation of the adjective αἰδία. However, the adjective is not preceded by an article in the text. On the other hand, translation (b.2) implicitly supplies a τοιαῦτα in order for the reading to be possible. As a result, in translation (b.1) μᾶλλον determines ὄντα: others believe that there are eternal substances, which are *beings to a higher degree*; by contrast, in translation (b.2) μᾶλλον, together with πλείω, qualify the implicit τοιαῦτα: others believe that there are *several* (viz. *things of this sort*) and that they are *more so* (viz. *of this sort*), because they are eternal.

I tend to prefer option (b.2) for the following interpretative reasons.

The meaning of (b.1) seems to suggest a strong contrast with group (a). The first group of people believes that no substances can be found beyond sensible bodies, while the second group believes in the existence of non-sensible substances, which are more in number and more real. Therefore, the two groups seem to be mutually exclusive: the first group believes that only sensibles can be substances (as there is nothing of such a sort, τοιοῦτον, beyond them), while the second group holds that only non-sensible things can be considered substances. Indeed, even though the two comparatives do not necessarily entail mutual exclusiveness, they nonetheless establish the superiority of eternal substances over sensible ones in terms of being and number, thus making the contrast tenable anyway.

comparison of πλείω. Accordingly, in Reale’s translation eternal substances are more numerous ‘delle (sc. sostanze) sensibili’, i.e. than sensible substances. In a later volume dedicated to the *Metaphysics* and the first philosophy of Aristotle, Reale (2008: 183) quotes the passage and gives a translation very close to (b.2). Nevertheless, as the volume is not intended as systematic translation of *Metaphysics*, I will refer to his earlier translation as the standard one.

⁸⁸ Following Menn’s translation (unpublished, IIa: 24). Bostock (2001: 2) follows the same interpretive direction, as do Frede and Patzig (1988: 63). For the sake of completeness, I should mention that, in their commentary, Frede and Patzig, (1988: 31-32) distinguish as many as three possible translations of the sentence. Indeed, they propose two different options of punctuation that open to three interpretive directions. Transl. 1 and 2 are derived by inserting a comma after ὄντα (i.e. οἱ δὲ πλείω καὶ μᾶλλον ὄντα, αἰδία); transl. 3 is obtained by inserting a comma after μᾶλλον (i.e. οἱ δὲ πλείω καὶ μᾶλλον, ὄντα αἰδία); While transl. 3, which is preferred over the others, coincides with (b.2), the two others deserve a quick comment. Transl. 1 corresponds to Ross’ translation (b.1), even though I do not see the need of a comma after ὄντα in order to make the reading possible. The translation is rejected on the basis of *Metaph.* 1028b17 and 21, which suggest that what is stake in the passage is a degree *in terms of substantiality*, and not in terms of being. Also, transl. 2, derived from the same punctuation, differs from transl. 3 (that is the same as b.2) only in the punctuation chosen for the Greek. Both translations are refused because the reading of αἰδία alone, isolated by the punctuation they proposed, creates problems. Accordingly, I don’t see the need for a third interpretive option as they do.

This interpretation, however, may face an initial complication: a comparison in terms of degree of being (i.e. eternal substances are more real than sensible ones) would not make much sense in a Platonic context, where a strong polarity between sensibles and Forms can be detected. Indeed, a comparison presented in terms of degree of being would dissolve the antithesis between Forms, essences in the full sense, and sensibles, which ontologically depend on the latter, establishing some sort of ontological hierarchy that is not explicitly exhibited in the Platonic dialogues.⁸⁹ Yet, the comparison does indicate a controversial point in Plato's ontology, as the relationship between sensibles and Forms never receives an exhaustive account and, from an Aristotelian perspective, might be subject to this interpretation. Despite this option, bringing in the discussion elements which are extraneous to the context of Z2 and to Aristotle's own interpretation may not be legitimate from a methodological point of view. In the end, in Z2 Aristotle maintains that Plato established three kinds of οὐσία: the Forms, the objects of mathematics *and* the substance of sensible bodies. Given this framework, a comparison in terms of being would still hold.

But the appropriateness of the comparison in terms of degrees of being can also be questioned with respect to the internal coherence of Z2. As Frede and Patzig observe in their commentary,⁹⁰ also the lines immediately preceding our passage⁹¹ suggest that what is at stake here is not a degree of being but, rather, a degree of substantiality. Indeed, in 1028b 16-17 Aristotle says that, for some people, 'τὰ τοῦ σώματος πέρατα, [...], εἶναι οὐσίαι, καὶ μᾶλλον ἢ τὸ σῶμα καὶ τὸ στερεόν', namely, that the limits of the body *are* οὐσίαι, and *even more* so than the body and the solid. Therefore, it would be more reasonable that the same comparison is here at stake: it is not that non-sensible οὐσίαι are considered to be more real than sensibles, but, rather, they are considered to be οὐσίαι *qua* substance to a higher degree. In this respect, I agree with Menn⁹² that lines 1028b 18-19 also refer back to the fifth aporia of book B;⁹³ in that circumstance, the question raised was 'whether we should say that there are only the sensible οὐσίαι, or also others besides these, and whether [these others] are all of the same kind or are *several genera of οὐσίαι*, [as claimed by] those who say that there

⁸⁹ For a recent study of the notion of οὐσία in the Platonic dialogues (and, in particular, in the *Theaetetus*, *Republic* and *Parmenides*), see Ferrari (2017). Ferrari argues that οὐσία in the dialogues expresses two different notions of separation: (a) 'simple separation' of the Form *qua* Form, peculiar to every Form as distinguished from particulars; and (b) 'peculiar separation' of each Form from other Forms, which constitutes its peculiar essence. For a comprehensive discussion of the term until Aristotle's technical use, see Motte-Somerville (2008).

⁹⁰ Frede-Patzig (1988: 31).

⁹¹ Arist., *Metaph.* Z2 1028b 17.

⁹² Menn (unpublished, IIα: 18) and Reale (2008: 183-184).

⁹³ See Arist., *Metaph.* B 997a 34-b3.

are the Forms and also the intermediates, which they say the mathematical sciences are about'.⁹⁴

Accordingly, I take the meaning of (b.2) to be closer to Aristotle's intentions in Z2 and to face fewer interpretative problems. If (b.1) somehow established two mutually exclusive groups or a comparison played by degrees of being, I believe that (b.2) opens the path to a more continuous understanding of the two groups. While the first group (a) denies the possibility of finding οὐσίαι beyond sensible bodies, the second group (b) would believe in the existence of many kinds of οὐσίαι beyond sensible bodies. This way, the second group: believes in the existence of different kinds of οὐσίαι beyond sensible bodies; establishes degrees of substantiality among those οὐσίαι; and considers substances beyond bodies to be οὐσίαι to a higher degree than the sensibles due to their eternity. Also, this interpretation does not exclude the possibility that the second group considers sensibles to be οὐσίαι as well. Indeed, the examples given by Aristotle seem to suggest exactly this: Plato is said to have established two kinds of οὐσίαι (i.e. Forms and mathematical), together with a third kind, that of sensible bodies; and Speusippus believed in the existence of even more substances. Provided that the Aristotelian description might not give a fair description of Plato's commitments,⁹⁵ the account seems to be much more generous in relation to Speusippus: apparently, for him, sensibles were to be considered substances⁹⁶ as well.⁹⁷

⁹⁴ Menn (unpublished, IIα: 18). And, in fact, Menn takes the πλείω in Z2 to also mean *several [genera]*, unpublished, IIα: 18 n. 29). Also Ross (1924b: 163) acknowledges that πλείω can be taken to mean both (i) 'more numerous than sensible substances' and (ii) 'more than one kind', but he prefers option (i).

⁹⁵ For sure with respect to sensible bodies, while the question about mathematical intermediates can be left open. See, e.g., the critique Reale addresses against Annas in Annas (1992: 14-15). For Reale, Annas is too reluctant to attribute Plato the theory of intermediates; Annas denies that such a theory can be found in the dialogues, but she is open to the possibility that it was part of Plato's exoteric teaching. On a more general level, this aspect may constitute a problem for my interpretation: if Aristotle's depiction of Plato's οὐσίαι can be considered unfair, the same can be said of Speusippus'. However, Aristotle's interpretation of Plato's οὐσίαι can be defended via a reference to Plato's dialogues, where the term is not used with technical nuance. See, e.g., Delcomminette's conclusion (2008a: 111) about the usage of the term in the *Republic*: 'Nous avons essayé de montrer qu'«être» était toujours à prendre dans ce dialogue (viz. the *Republic*) au sens d'être *quelque chose*, c'est-à-dire d'être *déterminé* d'une certaine façon. Cette détermination *peut être ou non parfaite* (my emphasis); mais l'οὐσία par excellence est ce qui est parfaitement déterminé [...]. Prise dans sa totalité, elle constitue donc l'objet propre du désir du philosophe, en ce qu'elle correspond au mode d'être qui seul peut procurer à celui-ci la connaissance à laquelle il tend. *Mais οὐσία peut également désigner l'être d'une chose particulière* (my emphasis), auquel cas ce terme renvoie plutôt au *contenu* de la détermination de la chose, c'est-à-dire à ce qu'elle est son essence'. For similar conclusions on the *Theaetetus*, see Delcomminette (2008b: 142); on the *Sophist*, Collette-Dučić (2008: 158); on the *Statesman*, Delcomminette (2008c: 163); on the *Philebus*, where the term is taken to be close to Aristotle's employment, Van Riel (2008: 173-174).

⁹⁶ At least in Aristotle's perspective.

⁹⁷ Regardless of whether this nuance can be correctly attributed to Aristotle's passage or not, a parenthesis related to the meaning and usage of the term οὐσία is required. Indeed, a precise definition of the term, together with a discussion of its meaning, significance, and reference, can only be found in Aristotle and cannot be attested with certainty for Speusippus. Moreover, as the term appears precisely in book Z of the *Metaphysics*, dedicated to an enquiry about substance, it is safer to consider it as a properly Aristotelian framework in which Speusippus' system is presented, rather than Speusippus' own terminology. Conversely, what we can conclude from our analysis is that, if Speusippus did indeed employ this term, his conception of οὐσία would likely be closer to the Aristotelian than to the Platonic notion, or, at least, of wider application than that of his master.

Accordingly, Aristotle’s description of previous philosophers’ ontology in [FR. 48] refers to two groups of people: the first group (a) believes that substances can be found only among sensible bodies; the second group (b) which includes Speusippus, believes in the existence of different kinds of οὐσίαι, including the sensibles, as arranged according to different degrees of substantiality.⁹⁸ To put it in another way, Speusippus belongs to that group whose arrangement of the world features different ontological levels. With this in mind, we can examine the following lines of Aristotle’s report more thoroughly.

Σπεύσιππος δὲ καὶ πλείους οὐσίας ἀπὸ τοῦ ἑνὸς ἀρξάμενος, καὶ ἀρχὰς ἐκάστης οὐσίας ἄλλην μὲν ἀριθμῶν, ἄλλην δὲ μεγεθῶν, ἔπειτα ψυχῆς.

Speusippus posited still more kinds of substances, beginning with the One, and positing principles for each kind of substance, one for numbers, another for spatial magnitudes, and then another for soul.

Aristotle adds that, *beside* the sensibles (παρὰ τὰ αἰσθητά), Speusippus established the existence of many οὐσίαι – and, along with these, of correspondent principles – among which he lists numbers first, next magnitudes, and then soul. Moreover, as Speusippus is credited with establishing *even more* substances than Plato, who is already ascribed three different kinds of οὐσίαι, namely Forms, mathematical and sensibles, we might think that we should include those substances in the list as well.

Accordingly:

	Aristotle’s list of οὐσίαι:			
Plato	τὰ εἶδη	τὰ μαθηματικά		ἡ οὐσία τῶν αἰσθητῶν σωμάτων
Speusippus	(τὸ ἓν) ⁹⁹	ἡ οὐσία τῶν	ἡ οὐσία τῶν μεγεθῶν	ἡ οὐσία τῆς ψυχῆς

(*Contra*, see Cattanei 1996: 152-153, who argues that Speusippus’ theory increases Plato’s theory ‘della sostanza soprasensibile’ in terms of principles, while reducing it in terms of genera). Indeed, an inclusive conception of substances that encompasses sensible bodies within its definition squares both with the rejection of Plato’s Forms and with the fact that the inquiry into the sensibles constituted a considerable part of Speusippus’ research. However, a second option is also possible. Mansfeld and others (1990: esp. 52-61) have shown that previous to Aristotle there was a tradition of classifying philosophers’ views on the basis of the ὄντα they established, a tradition that both Plato and Aristotle used in order to make their classifications (on this, see also Menn 2012: 206-207). Accordingly, another possibility would be to consider the term οὐσία Aristotle uses here as a superimposition of his terminology onto a classification of ὄντα Speusippus did actually establish.

⁹⁸ As highlighted in the previous footnote (n. 78), we must keep in mind that the language of substantiality may or may not represent a helpful tool when thinking about Speusippus, who might have thought of his arrangements of the components of the world otherwise. In order to facilitate the reading, however, I will keep using this formulation throughout this section. Indeed, on the one hand, the framework for Speusippus’ theories is provided by Aristotle, and, in this regard, the formulation is faithful; on the other hand, the formulation is still helpful for thinking of an internal order of the arrangement, which, although phrased by Aristotle in terms of substantiality, might reveal a different but compatible rationale for it.

⁹⁹ It is unclear whether τὸ ἓν needs to be included or excluded from Aristotle’s list of οὐσίαι. The reasons for such doubts will be clarified in the next paragraph.

		ἀριθμῶν			(τὰ αἰσθητά) ¹⁰⁰
--	--	---------	--	--	-----------------------------

From a comparison of Aristotle's lists of Plato's and Speusippus' οὐσίαι, one more aspect emerges: Aristotle seems to intend Speusippus' multiplication of the οὐσίαι as a multiplication of *the kinds* of οὐσία. It is not that, in comparison with Plato, Speusippus takes into account more of the world. Rather, Speusippus posited even more οὐσίαι because he further subdivided in kinds some of the οὐσίαι Plato established.¹⁰¹ And such a reading seems to be confirmed by parallels with other Aristotelian passages in book B.¹⁰² Thus, a gradual structure of reality starts to be delineated; at the top we find primary principles,¹⁰³ followed by numbers, magnitudes, soul, and probably, as we have just seen, sensibles at last. And for each οὐσία, specific principles. Therefore, Aristotle's testimony provides us with considerable information about the elements composing the various levels of Speusippus' world. Despite the apparent clarity of the content, though, a second glance reveals more challenges.

Primary principles

First of all, the passage raises an obvious question about principles in general, and, more specifically, about primary ones: the One (τὸ ἓν) and Plurality (τὸ πλῆθος). Are primary principles to be considered in the same manner as the other substances listed or not? The Greek formulation, 'Σπεύσιππος δὲ καὶ πλείους οὐσίας ἀπὸ τοῦ ἐνὸς ἀρξάμενος' seems to

¹⁰⁰ Aristotle appears to now take for granted that there are sensible οὐσίαι. On this aspect, see Menn (unpublished, IIa: 18).

¹⁰¹ My chart converges completely with Gaiser's scheme (1998: 227). For a different interpretation of the kinds in Speusippus' system and a discussion of previous scholarly hypotheses, see Tarrant (1974: 144 specifically). In particular, Tarrant discusses the positions of Merlan and Krämer and offers his own interpretative solution on the basis of a comparison of Speusippus' οὐσίαι with the hypotheses of Plato's *Parmenides*. On the basis of Aristotle's passage, Krämer identifies four kinds (as I do in the scheme) + the primary principle (which, however, he lists among the οὐσίαι). Differently, Merlan recognises five different kinds (the chart diverges from mine only insofar as two kinds of bodily οὐσίαι are accounted for), with the soul in the middle. The reason for the postulation of two bodily οὐσίαι (i.e., body-inferior bodily entities) responds to the need to account for a puzzling passage of Theophrastus (fr. 71 IP₁), in which τὸ τίμιον is said to be at 'centre of being' (περὶ τὴν τοῦ μέσου χώραν) with the extremes on either side τὰ δ' ἄκρα ἐκατέρωθεν' Tarrant (1974: 133). Tarrant's own scheme is very close to Merlan's, although it is more detailed in providing material principles for each kind, as well as attributes. Although both Merlan and Tarrant rely heavily on Iamblichus' *DCMS* (fr. 72 IP₁) for their identification, it is noteworthy that none of them include the One among the οὐσίαι.

¹⁰² See, e.g., aporia 5, Arist., *Metaph.*, B2 997a34-b3, transl. Menn (ivi): 'whether we should say that there are only the sensible οὐσίαι, or also others besides these, and whether [these others] are all of the same kind (my emphasis) or are several genera of οὐσίαι, [as claimed by] those who say that there are the forms and also the intermediates, which they say the mathematical sciences are about'. Menn takes Aristotle in Z2 to be speaking about *kinds* of οὐσίαι just as he does in aporia 5, book B. This reading is justified also by reference to Plato, *Sophist*, 245a-246c, where the discussion, evoked by Aristotle, relates to whether οὐσίαι are bodies, incorporeals or both.

¹⁰³ As previously emphasised, the context does not allow a full and detailed examination of each aspect related to Speusippus' philosophy. Accordingly, for some controversial issues, here as well as in other circumstances, I will rely on the two extensive analyses conducted by Isnardi Parente (1980) and Tarán (1981: 33). In this particular case, I take for granted that Speusippus theorised the existence of a second principle, Plurality (τὸ πλῆθος), that is absent in the fragment under analysis, but is nonetheless attested by fr. 64, 66, 75, 82, 82a, 83, 84 IP₁.

suggest that, at least for Aristotle, we should consider the One as included in the list: first principles are οὐσίαι just as much as numbers, spatial magnitudes and the soul. However, the sentence, constructed with ἀρξάμενος in the nominative connected to Σπεύσιππος and followed by ἀπὸ plus the genitive, keeps an intrinsic ambiguity in Greek just as it does in English. ‘Starting from the One’ might suggest both an inclusive¹⁰⁴ as well as an exclusive¹⁰⁵ consideration of the One among the list of οὐσίαι. It must be said that a parallel examination of the grammatical construction in Aristotle reveals that its usage quite often bears an inclusive meaning.¹⁰⁶ Nevertheless, grammatical parallels cannot be considered as conclusive here.¹⁰⁷ Indeed, if we consider the passage as a whole, and we examine its implications in terms of meaning, other problems arise. For instance, Aristotle says that Speusippus posited principles for each kind of οὐσία, starting from the One. Then, in the list, numbers, magnitudes and the soul appear. Accordingly, if, as Aristotle said, Speusippus posited principles for each οὐσία, and if, as we assumed before, the One is an οὐσία as well, the One itself would also require a principle rather than being a principle itself.

One possible way to solve the difficulty would be to consider the One to which Aristotle

¹⁰⁴ For instance, this is ps.-Alexander of Aphrodisias’ reading of the text (*In Arist. Metaph.*, 462, 34ff Hayduck = fr. 49 IP₁); thus, the commentator lists the One as the first οὐσία (πρώτην μὲν τὸ αὐτοέν). The clearest examples of an inclusive reading of the middle voice of the verb ἀρχω in constructions such as: ‘ἀρξάμενος ἀπὸ + gen’ occur in Euclid. E.g., ‘ἀρξάμενον ἀπὸ τοῦ Θ τὴν ΘΜΒ διαπορεύεται’, Eucl., *Phaenomena*, 9.37. Tarán contends that the One should be considered the first οὐσία (and the first number) precisely by means of an inclusive reading of the construction. In his response to Mueller (1986), Tarán (1991: 228-230) makes it clear that he considers the construction to be necessarily inclusive. For a longer discussion of the topic, see Tarán (1981: 32-41).

¹⁰⁵ If not exclusive, at least not clearly inclusive. And this seems the way in which Asclepius understands the sentence in his *Commentary on Aristotle’s Metaphysics* (fr. 50-51 IP₁). For in both passages (Ascl., *In Arist. Metaph.*, 379 12ff and 377 34ff Hayduck) the One does not appear in the list of Speusippus’ substances (cf. especially 377 34ff: καὶ ὁ μὲν Σπεύσιππος πολλὰς ἔλεγεν εἶναι οὐσίας· ἄλλην γὰρ οὐσίαν ἔλεγεν εἶναι μεγεθῶν καὶ ἄλλην ἀριθμῶν [...]). Although the passage offers a reinterpretation of Aristotle’s lines in which the kinds Aristotle identified are multiplied in even further species, the One does not appear nevertheless. It is true, however, that Asclepius is not well-known for his originality (see e.g. Tarán 1969: 8 and Cardullo’s (2002: 507-513) partially rehabilitative comments) and might be relying on Syrianus’ own exegesis of book Z (Luna 2001: 142-174) which he simplified. For Aristotelian cases in which the construction does not seem to be clearly inclusive, see e.g. Arist., *HA*, II 17, 507a 36-507b 1, ‘ὁ μὲν στόμαχος ἀπὸ τοῦ στόματος ἀρξάμενος ἐπὶ τὰ κάτω παρὰ τὸν πλεῦμονα’. In this case, the mouth is where the oesophagus originates, but is not part of the oesophagus itself. The construction is similarly difficult to determine when it refers to time-periods. See, e.g. Arist., *HA*, 564a 19, where Aristotle says female pigeons sit on their eggs ‘starting from the afternoon’ (ἀπὸ δειλῆς ἀρξαμένη) or *HA*, 633a 13-14, where Aristotle says the cuckoo becomes visible ‘starting from spring’ (ἀρξάμενος ἀπὸ τοῦ ἔαρος). Here as well, not only the seasons (which might be considered ambiguous in principle) but also the risings of the stars seem to rather determine an origin, or limit, for the event to happen. In fact, the migration of birds (or hibernation, as Aristotle believed) as well as the sitting-times on their eggs are regular insofar as periods are concerned, not days. On the determination of time according to the risings and settings of the stars, see Peck (1970: 383-408). This reading of the One as the *origin* of the series (but not as part of it, see Smyth (1956, 1348 b) on the usage of ἀπὸ or ἐξ + genitive with verbs of beginning), also squares with Aristotle’s own conception of a series. See Kirwan (1998: 153): ‘According to Aristotle every series must have an ‘origin’, which is *either its first member or something outside the series* (as a parent is the origin of the developing stages of his child)’, my emphasis.

¹⁰⁶ See, e.g. in constructions such as ‘ἀρξάμενοι πρῶτον ἀπὸ τῶν πρώτων’ in Arist., *EE* 1217a 18; *PA*, 646a 3, 655b 28, *Poet.*, 1447a 12; similarly, also in *A.Po.*, 81b 38; 81b 40.

¹⁰⁷ Especially since both forms are attested in Aristotle’s *corpus*. See *infra* footnotes 104 and 105 above.

refers as the first number, and not as a principle. At the same time, though, it would not really make sense to consider the One Aristotle refers to as the first number, since numbers appear immediately afterwards in the list. As the One is listed as the first item, and numbers come right after it, I see no reason for repetition on Aristotle's part.¹⁰⁸ Accordingly, it seems more plausible to consider the One here referred to as a principle, and to consider it as principle of numbers.¹⁰⁹ This squares with the fact that, in Aristotle's formulation, the sentence highlighting principles for each kind of οὐσία follows the sentence regarding the One:

Speusippus posited still more kinds of substances, beginning with the One, and positing principles for each kind of substance.

But if we take the One to be the principle of numbers, we need to conclude that the One, as primary principle, cannot be an οὐσία even for Aristotle, or at least not properly speaking, since it is a principle itself and it does not require another principle.¹¹⁰

A second solution, which seems more plausible to me, might be found in considering the difficulties of Aristotle's passage as a reflection of a difficulty Aristotle himself had in translating Speusippus' system into his own theoretical language and framework. Indeed, what if Speusippus' principles had an ontological status that was thought to be ambiguous by Aristotle? In the end, first principles could not be the same as Platonic Forms, since Speusippus

¹⁰⁸ Moreover, to suppose that Speusippus did not consider the One as a number would also be preferable on the basis of the cultural background of his time (cf. Arist., *Metaph.*, N 1088a6ff). On the One not being regarded as a number, see Heath 1921: 69-70 and ff.). For an identification of the One with number 1 in this passage, see Tarán (1981: 35ff). *Contra*, Dillon (2003: 44ff), who differentiates different dimensions for the One as principle of all things, principle of numbers and a number itself. For a discussion of the consideration of One as an element and principle of numbers in Theon of Smyrna, see Petrucci (317-320 and 329-330) who traces the roots of such a discussion back to Academic theories. On Aristotle's discussion of the one as a unit of measure (in *Metaph.* I), see Centrone (2005: 49-64). On Aristotle's own conception of the One, more specifically, see Castelli (2010). On Aristotle's testimony of the principles as related to Pythagoreans, see Horky (2013a: 22-27). Tarán, who interprets the One as number one, relies mainly on ps- Iamblichus (fr. 122 IP₁). However, the consideration of the One as a principle does not exclude its arithmetical employment (see Acerbi 2010: 236ff).

¹⁰⁹ I agree with Isnardi Parente (2005, *Commento* (a): 14) on this point. In order to support her interpretation, Isnardi Parente quotes Arist. *Metaph.* M10, 1087a3: the One is not the first of a series (πρῶτον), but rather it is its foundation (πρότερον). The whole Aristotelian passage is very interesting as it addresses the problem of whether the principles-elements are substances or not. *Contra*, see Tarán (1981: 300-302), who takes the One listed here as the first number. Differently, Dillon (2003: 51) opts for a triple multiplication of the One, and argues that Speusippus postulated 'three distinct entities: a supreme 'One', or Unity, the first principle of all things, a secondary 'One', or Unit, which is the immediate product of the primal One and Plurality, and serves in turn as the first principle of Number—and thirdly, the purely mathematical 'one' [...]'.
¹¹⁰ For an overview of scholarly interpretations of the passage, see Isnardi Parente (2005, *Commento* (b): 12-14). Isnardi Parente identifies two different and equally misleading interpretations of the passage: on the one hand, to take Aristotle too literally and establish a lack of connection between the realities Aristotle lists, e.g. Stenzel (1929), Rabinowitz (1957: 87ff), Tarán (1981: 300-302); on the other hand, to establish a derivative connection between them and colour Speusippus' interpretation of a Neoplatonic nuance, e.g. Ravaisson (1838: 36ff); Dodds (1928: 129-142); Merlan (1953: 96-140), Krämer (1964: 31-32; 208; 214-215). Isnardi Parente takes a middle position: she acknowledges Speusippus' realities as independent from one another, but she connects them by means of their analogy. As to my interpretation, Isnardi Parente would certainly list it among those which take Aristotle too much literally.

refused to admit their existence, and they were not even comparable with Aristotelian substance, i.e. with individual objects and their species.¹¹¹ At the same time, Aristotle reports that the Academics referred to their principles as στοιχεῖα,¹¹² thus creating confusion regarding their ontological status. Accordingly, for the moment our analysis will conclude that at least in Aristotle's mind, Speusippus' principles possibly bear a peculiar ontological status, which might not be precisely the same of other οὐσίαι.

Other principles?

The consideration of the One raises an obvious and related question: are primary principles different than other kinds of principles? And how do other principles work? Not to fall short of expectations, it must be said that the material preserved does not allow a clear reconstruction of each stage of reality together with its principles.¹¹³ Similarly, it is extremely difficult to be more precise about what distinctive features principles other than primary feature. In order to solve these puzzles and defend Speusippus' system from the charge of disconnection,¹¹⁴ scholars often established an analogical relationship between the pair of first principles (One-Plurality) and principles of different stages of reality.¹¹⁵ The

¹¹¹ See Arist., *Categ.*, 5.11-17: 'A substance—that which is called a substance most strictly, primarily, and most of all—is that which is neither said of a subject nor in a subject, e.g. the individual man or the individual horse. The species in which the things primarily called substances are, are called secondary substances, as also are the genera of these species. For example, the individual man belongs in a species, man, and animal is a genus of the species; so these—both man and animal—are called secondary substances', transl. Ackrill. Once more, the passage quoted above (Arist. *Metaph.* M10, 1087a1-1087b 8) reveals telling: 'if the first principles are universal (καθόλου αἱ ἀρχαί) either the substances composed of them will be universal too, or there will be a non-substance prior to the substance (ἔσται μὴ οὐσία πρότερον οὐσίας); because the universal is not substance and the element or first principle is prior to that of which it is an element or first principle (πρότερον δὲ τὸ στοιχεῖον καὶ ἡ ἀρχὴ ὣν ἀρχὴ καὶ στοιχεῖον ἐστίν)'. The problem arises because of the Academics' consideration of the principles as elements.

¹¹² See, e.g., among many passages, fr. 58 IP₁.

¹¹³ It is generally accepted that Speusippus identified the principles of magnitudes with point (ἡ στιγμή) and place (ὁ τόπος), although Aristotle is not consistent in the attribution and other times speaks of extension (διάστημα), see, e.g., Arist., *Metaph.* N, 1092a17-20 and M, 1085b31. As for the soul, things become even more complicated. It is only through Posidonius that we receive a definition of the soul as 'the form of the omni-dimensionally extended' (ἰδέα τοῦ πάντη διαστατοῦ), a definition Posidonius advocates for himself (Plut., *De anim. Proc.*, 22, 1023b). Isnardi Parente (2005, Introduzione: 8) suggests as principles of the soul τέτρας and διάστασις, but she needs to rely on ps-Iamblichus (*Theolog. Arithm.*, 61-62) and on a dubious attribution of a passage in *De Caelo* for textual evidence (III, 307a29-307b3 = *Supplementum Academicum* 122a). Lastly, she identifies in the couple ταῦτον-θάτερον (inspired by Plato's *Sophist*; Isnardi Parente 1979: 63) the principles of sensible things. Tarrant (1974: 135) offers a different interpretation for the identification of principles by giving priority to the One: 'He begins only with the formal principle, which is always the One in some particular guise [...] and gradually builds up larger structures until the receptacle as a whole is finally revealed'; accordingly, for Tarrant the material principle of numbers is πλῆθος, of geometricals τόπος, of psychicals κίνησις, of bodies κενόν and of φανυλόμενα, ἄπειρον. However, in order to provide such details, Tarrant relies heavily on ps-Iamblichus' *Theolog. Arithm.* (=fr. 122 IP₁), whose content on such topics is not paralleled elsewhere. Pesce (1961: 56) offers an interpretation similar to Tarrant's.

¹¹⁴ Aristotle's charge of disconnection against Speusippus' system will be analysed in the next section (1.2).

¹¹⁵ See Stenzel (1929) who equates the concept of ὁμοιότης and that of ἀναλογία. Accordingly, ὅμοιον ultimately means 'proportionally analogous' and bears a mathematical meaning. Isnardi Parente (2005) disagrees on the mathematical reference, especially when applied to the sensibles; rather, she characterises the ὁμοιότης as a functional analogy. However, as Napolitano-Valditara rightly emphasises (1988: 249, n. 69), it is not clear how the analogy works precisely. In particular, Napolitano-Valditara highlights that it is difficult

resulting picture is that of a system in which, coherently with Aristotle's testimony in Z2, different realities have indeed their peculiar principles; however, principles at different levels are nevertheless related by means of similarity to one another. All of these issues will be addressed in more detail later on.¹¹⁶ For our purposes, it is important to underline that apart from scattered Aristotelian comments about principles, the only fragment preserving information about principles in general is preserved by Proclus,¹¹⁷ and its content seems to play a specific role in Proclus' own formulations. Accordingly, questions regarding the functioning of primary principles will be addressed at the conclusion of our analysis, in order to gather all the information at our disposal first.

With regard to the realities populating Speusippus' world, Aristotle's passage does point to (at least some of) them: numbers, spatial magnitudes, the soul and the sensibles. As each component will be analysed in detail in the following chapters, I will limit myself to a brief introductory outline of each item and of the general framework we can get from the fragment under consideration.

The mathematical realm

From Diogenes Laertius' catalogue,¹¹⁸ we learn that Speusippus wrote a book entitled *Μαθηματικός*, the *Scientist*.¹¹⁹ If the title's reference to mathematical and geometrical practices cannot be established conclusively,¹²⁰ it is probable Speusippus recognised

to understand how the *στιγμή* can work as the formal principle for magnitudes, and how the *ταῦτον* can perform the minimalistic functions that the *ἐν* and the *στιγμή* perform at different levels. Moreover, as Isnardi Parente understands first principles as the condition of possibility of numbers, it is unclear how the *ταῦτον* can perform a similar function at the level of the sensibles.

¹¹⁶ For my position on the relationship between different ontological levels, see next section (1.2). For the analogical relationship between different levels of the system established by scholars, see Chapter 4. For the functioning of first principles, see Chapter 6.

¹¹⁷ Fr. 35 IP₁ (= Procl., *In Eucl.* p. 179, 12-22 Freidlein).

¹¹⁸ Diog. Laert., IV 1-5. On the lives of Speusippus and Xenocrates, see Dorandi (2008). On book IV more generally, see Dorandi (1999) and (1992).

¹¹⁹ Possibly a dialogue. Zeller (Zeller, Mondolfo 1974: 1006, n. 3) believes the book to be the first part of *On Pythagorean Numbers*. *Contra*, Lang (1911:30) thinks the title of the book clearly indicates it was a dialogue. On this basis, he arbitrarily corrects the list of books reported by Diogenes and moves it to the first part of the catalogue (see Dorandi 1992: 37-66). See also Isnardi Parente (1980: 212-213 and 216) and Tarán (1981: 188-199).

¹²⁰ If Isnardi Parente is cautious in acknowledging a mathematical reference in the title of the treatise, which she translates as 'Lo Scienziato' (Isnardi Parente 1981: 36. And similarly, Dorandi (1999: 493) who translates 'Le Savant'), Bénatouïl and El Murr (2010: 57) more confidently suggest as Speusippus' background the reference to Plato's *Republic* (527aff.). Bénatouïl and El Murr (2010: 61) also note that besides the *Μαθηματικός*, Diogenes reports of another book entitled *Φιλόσοφος*. They contrast the two books on the basis of two different practices, one peculiar to the geometer, another to the philosopher. On the conception of ancient Greek *μαθήματα*, and the usage of the term with reference to arithmetics, geometry, astronomy and harmonics, see Vitrac (2005), Zhmud (2006: 122-124) and (2018: 451-452): 'From him (viz. Archytas) this idea passed onto Plato and Aristotle and became firmly established in Greek culture. In the mid fourth century B.C.E. this group of sciences, in which the application of mathematical methods was common (my emphasis), was joined by mechanics and optics. This canonical set of *mathēmata* survived with very minor variations until the end of

mathematics and geometry as theoretical sciences nevertheless.¹²¹ Indeed, in line with Plato's requirements for stable objects of knowledge, mathematical objects are eternal, immobile and not subject to change. In this respect, it is important to stress that Aristotle's terminology is usually inconsistent and fluctuates mainly between τὰ μαθηματικά and ὁ μαθηματικὸς ἀριθμός. However, it seems reasonable to say that both numbers and geometrical items fall under the mathematical realm and that both are in question when Aristotle speaks generically of τὰ μαθηματικά.¹²² What Aristotle consistently says is:

- Speusippus rejected ideal number and postulated mathematical number only;¹²³
- mathematical number (or mathematical objects) is the first of beings (τὸν πρῶτον τῶν ὄντων).¹²⁴
- mathematical number is a reality in itself¹²⁵ and is not conceived as a cause.¹²⁶

Aristotle's insistence in characterising mathematical number as the first 'being'¹²⁷ might support the doubts we raised concerning his interpretation of Speusippus' principles. On the one hand, the characterisation of the principles as στοιχεῖα suggests him a physical consideration of them; on the other hand, as numbers (or mathematical objects) are said to be the first ὄντα, Speusippus' principles cannot be considered 'beings', or at least not fully.¹²⁸ By considering mathematical number as *the first of beings*, primary principles at least, but possibly also other kinds of principles, are left out. If primary principles are not ὄντα, how should we conceive of them? Fortunately, as the relationship between first

antiquity. [...] Those engaged in these disciplines called themselves, and were called by others, *hoi peri mathēmata* or *hoi mathēmatikoi*'.

¹²¹ See Tarán (1981: 424-425). The identification of arithmetics and geometry as the objects of theoretical sciences will be discussed in more detail in Chapter 3.

¹²² The possibility of a unitarian consideration of the mathematical realm will be tested at various stages of my analysis. However, it must be said from now that extant Aristotelian fragments on Speusippus never discuss magnitudes (μεγέθη) at length. Indeed, except for fr. 84 IP₁ which examines the principles of μεγέθη, magnitudes are usually mentioned at the end of the argument, with formulations such as: 'ὁμοίως δὲ καὶ τὰ μεγέθη' (see, e.g. fr. 75 and 80 IP₁). This may be a consequence of the fact that most of the Aristotelian fragments concerning Speusippus are to be found in books M and N of the *Metaphysics*, where Aristotle has the Academics' conceptions of *numbers* as the first target. In this respect, contradictions about magnitudes would already follow from those Aristotle draws about numbers.

¹²³ See, e.g. fr. 52, 73, 74, 75, 76, 77 IP₁

¹²⁴ See, e.g. fr. 52, 74, 75 IP₁.

¹²⁵ καθ' αὐτὴν φύσιν, Arist., *Metaph.*, N2, 1090a 12-13 (=fr. 80 IP₁).

¹²⁶ Arist., *Metaph.*, N2, 1090a10-12 (=fr. 80 IP₁); N3, 1090b16-19 (=fr. 86 IP₁)

¹²⁷ As well as mathematical substance as *the only οὐσία 'παρὰ τὰς αἰσθητὰς οὐσία'* (Arist. *Metaph.*, M1, 1076a11), as in fr. 74 IP₁: ἕτεροι δὲ τινες τὰς μαθηματικὰς μόνον οὐσίας εἶναι φασι.

¹²⁸ See *infra*, footnote 97. Before Aristotle, the doxographic tradition classified philosophers according to the number and character of ὄντα they established. See Mansfeld (1990) and Menn (2012: 207): 'the pre-Platonic doxographic classification of the philosophers based on what ὄντα they posited was really a classification of what things they posited as having existed from the beginning'. In this respect, the list of Speusippus' items, despite Aristotle's language of substantiality may also be understood as a list of the ὄντα he posited; and Aristotle's consistency in speaking of number as the first of beings (τῶν ὄντων) may be taken as a confirmation of such a supposition.

principles and numbers is the best attested, we can attempt an investigation of the relation between principles and corresponding kind of οὐσία, by analysing the relation between primary principles and mathematical number/objects.¹²⁹ Lastly, it is important to emphasise Aristotle never attributes to Speusippus' mathematical objects any kind of causal activity. As it will be clear from the next two sections (1.2 and 1.3), the exemption from causal activities granted to mathematical objects will have a significant impact on Speusippus' system; indeed, this aspect provides evidence to understand both Speusippus' rejection of Forms as well as the charge of episodicity Aristotle addresses against his system.

The soul

Concerning the soul, the situation becomes even more difficult: indeed, among extant Aristotelian testimonies concerning Speusippus, only *one* passage mentions the soul. Moreover, the passage does not help at all any understanding about the soul itself, as it only tells us that the statements of mathematics (τὰ λεγόμενα)¹³⁰ please the soul (σαίνει τὴν ψυχὴν).¹³¹

For this reason, in the present context the soul will not receive a separate and specific account. In order to compensate the absence of such aspect, which would be important for a clearer understanding of Speusippus' epistemological theories but is absent in Aristotle's testimonia, Chapter 5 will take into account an epistemological fragment preserved by Proclus in the *Commentary on the First Book of Euclid's Elements*. Although the fragment refers generally to the hunt for knowledge performed by διάνοια and does not provide additional information about Speusippus' conception of the faculty/faculties responsible for our knowledge, nevertheless it represents unique evidence for Speusippus' conception of the process of knowledge.

The sensibles

Lastly, even though not explicitly listed in Aristotle's list, Speusippus' world probably features sensible objects. That this is the case is hinted by the fact (i) that in Aristotle's list of Plato's οὐσίαι sensibles occur explicitly,¹³² and (ii) that in other contexts Aristotle more explicitly opposes mathematical objects to sensibles.¹³³ However, the fact that sensibles are

¹²⁹ See Chapter 3.

¹³⁰ As Tarán shows, (1981: 318-319) the reference to mathematics is ensured by the context.

¹³¹ Arist., *Metaph.* N3, 1090a35 -1090b1 (=fr. 80 IP₁).

¹³² In general, it seems that in Z2 Aristotle takes for granted that sensibles οὐσίαι exist. See Menn (unpublished, IIa: 18): 'While he here treats it as formally open whether there are sensible οὐσίαι (and it is genuinely open whether all alleged sensible οὐσίαι have the same status), he still says that 'οὐσία seems to belong most manifestly to bodies', and all of the views he cites (including Plato's, 1028b19-21) do concede that there are sensible οὐσίαι, even if perhaps these are not οὐσίαι in as high a degree as the eternal things'.

¹³³ See, e.g., Arist., *Metaph.* N3, 1090a35-1090b1 (=fr. 80 IP₁).

not explicitly included in Aristotle's list may raise other doubts: do sensibles (*qua* sensibles) have their principles as well? Or are they absent from Aristotle's list of οὐσίαι and correspondent principles because they don't?

Moreover, a consideration of the sensible world is usually neglected or incidental in scholarly accounts, which have paid more attention to reconstructing metaphysical theories preserved in later sources, than in giving Speusippus' focus on scientific research the right credit. Besides the biological fragments preserved by Athenaeus, Diogenes Laertius bears witness of not one, but *ten* volumes of a book of (*Dialogues*) *On the science of Similar*s, of a book entitled *Divisions and Hypotheses on the Similar*s and of a book on *Examples of Genuses and Species*. Given this background, although not extensively discussed by Aristotle in his *testimonia*, sensible objects seem to constitute a conspicuous part of Speusippus' world. With this in mind, section 4.1 will provide, in parallel with Aristotle's testimony, a discussion of the fragments preserved by Athenaeus, in an attempt to do justice to the weight conceded to the sensible world by Speusippus' own research.

1.2 The episodicity of the world (frr. 86; 52)

Once the items composing Speusippus' world have been identified, it is reasonable to ask the following question: how are these related to one another? Part of the answer can be found in one of the most famous critiques addressed by Aristotle to Speusippus: the charge of the episodicity of the world. Indeed, in *Metaphysics* N,¹³⁴ Aristotle accuses Speusippus of having condemned the world to a badly constructed tragedy. For Aristotle, if we judge ἐκ τῶν φαινόμενων, nature does not appear to be episodic at all. Likewise, at the beginning of his *Metaphysics*, Theophrastus addresses the same charge to Speusippus.¹³⁵ In the study of nature, the starting point is to understand 'whether there is some connection (συναφή)¹³⁶ and something like a mutual association (οἶον κοινωνία) between intelligibles and the things of nature'.¹³⁷ His conclusion is, straightaway, that it is more reasonable (εὐλογώτερον) to suppose that there is some connection and to suppose that the whole is not episodic. But what does this disconnection amount to? In order to answer this question, let us analyse

¹³⁴ Arist., *Metaph.* N3, 1090b13-20 = fr. 86 IP1.

¹³⁵ Theophr., *Metaph.*, 4a 9-17 in Gutas (2010: 110-113). On this passage, cf. Petrucci (2018: 106) 'To put it briefly, μὴ ἐπεισοδιῶδες τὸ πᾶν (*Metaph.* 4a14): the world is *a consistent whole*, encompassing a perfect realm, whose very structure ensures its own qualified permanence, and a lower one, whose permanence and regularity is determined by the former. All this leads to a qualitatively determined conception of the world's dynamics: after all, Theophrastus seems willing to regard the world's order as good, to the point of stating that providence rules over the heavenly realm'. For an organicistic reading of Theophrastus' doctrine, see van Raalte (1988).

¹³⁶ It is probably relevant the difference Aristotle draws between ἀφή and σύμφυσις in *Metaph.* Δ 4, 1014b22-26, here evoked by Theophrastus' employment of the word συναφή 'i.e. (viz. the difference) between mere contact and organic unity [...]; in the latter case apart from contact there is in both parts *something which makes them one relatively to continuity and quantity*' (Alexandru 2014: 122, my emphasis).

¹³⁷ Gutas (2010: 111).

Aristotle's fragment directly:

[FR. 86] ἔτι δὲ ἐπιζητήσειεν ἂν τις μὴ λίαν εὐχερὴς ὢν περὶ μὲν τοῦ ἀριθμοῦ παντὸς καὶ τῶν μαθηματικῶν τὸ μὴτὲν συμβάλλεσθαι ἀλλήλοις τὰ πρότερα τοῖς ὕστερον (μὴ ὄντος γὰρ τοῦ ἀριθμοῦ οὐθὲν ἦττον τὰ μεγέθη ἔσται τοῖς τὰ μαθηματικὰ μόνον εἶναι φαιμένοις, καὶ τούτων μὴ ὄντων ἢ ψυχὴ καὶ τὰ σώματα τὰ αἰσθητά· οὐκ ἔοικε δ' ἡ φύσις ἐπεισοδιώδης οὕσα ἐκ τῶν φαινομένων, ὥσπερ μοχθηρὰ τραγωδία).

Again, if one is not too easily satisfied, one might inquire further with regard to all number and the objects of mathematics, that they contribute nothing to one another, the prior to the posterior; for if number did not exist, none the less magnitudes would exist for those who maintain the existence of the objects of mathematics only, and if magnitudes did not exist, soul and sensible bodies would exist. But the phenomena show that nature is not a series of episodes, like a bad tragedy.¹³⁸

In this passage, Aristotle points out at something which constitutes, in his view, a general problem of Speusippus' system: if one were to press him further on number and mathematical objects in general, she would realise that these do not *contribute* anything to one another. Crucial here is the verb συμβάλλω, which establishes the relationship at stake. As Crubellier emphasises in his commentary,¹³⁹ the verb is used in the same way it is employed by Aristotle in M5 (1079b 12-13),¹⁴⁰ namely to express the role that objects presented as ontologically prior play in the explanation of those which come after them.¹⁴¹ The connection with this second passage, in which Aristotle famously asks: τί ποτε συμβάλλονται τὰ εἶδη ἢ τοῖς αἰδίοις τῶν αἰσθητῶν ἢ τοῖς γιγνομένοις καὶ φθειρομένοις, is

¹³⁸ Arist., *Metaph.* N3, 1090b13-20 = fr. 86 IP₁, Transl. Ross, slightly modified.

¹³⁹ Crubellier (1994: 496). Accordingly, the verb is not used with the technical meaning of 'to compare, or to be comparable' (see, Ross 1924b: 427, but also Mulgan 1974: 67). So concludes Riesbeck (2016: 263-265) in the context of book 3 of the *Politics*, where he translates the verb as 'to contribute'. For a similar use of the verb in Aristotle, with the sense of 'to contribute', see Arist., *De An.*, 1, 1, 402a5: 'The knowledge of the soul admittedly *contributes* (συμβάλλεσθαι) greatly to the advance of truth in general', transl. Smith; *Ivi*, 2, 3, 414b10-11: 'Sounds, colours, and odours *contribute* (συμβάλλεται) nothing to nutriment', transl. Smith; *EE* 3, 7, 1234a30: 'Therefore envy *contributes* (συμβάλλεται) to injustice (for the actions that spring from it affect another person)', transl. Rackham; *EN*, 7, 14, 1154a 22-23: 'Since we should state not only the truth, but also the cause of error—for this *contributes* (συμβάλλεται) towards producing conviction', transl. Ross; *GA*, 1, 20, 727b 3: It is clear then that the female *contributes* (συμβάλλεται) the material for generation, and that this is in the substance of the menstrual discharges', transl. Platt. 1; *GA*, 1, 21, 730a 25-26: 'the *contribution* (συμβάλλεται) of the female to the generative product is not the same as that of the male', transl. Platt; *Poet.*, 1458b1-2: 'A major *contribution* (οὐκ ἐλάχιστον συμβάλλεται) to clarity and unusualness of diction is made by lengthenings, shortenings, and modifications of words', transl. Halliwell (note that Bywater translates directly 'what helps most').

¹⁴⁰ Arist. *Metaph.* M5, 1079b 12-13: Πάντων δὲ μάλιστα διαπορήσειεν ἂν τις τί ποτε **συμβάλλονται** τὰ εἶδη ἢ τοῖς αἰδίοις τῶν αἰσθητῶν ἢ τοῖς γιγνομένοις καὶ [τοῖς] φθειρομένοις· οὔτε γὰρ κινήσεώς ἐστιν οὔτε μεταβολῆς οὐδεμιᾶς αἰτίας αὐτοῖς. ἀλλὰ μὴν οὔτε πρὸς τὴν ἐπιστήμην οὐθὲν βοηθεῖ τὴν τῶν ἄλλων (οὐδὲ γὰρ οὐσία ἐκεῖνα τούτων· ἐν τούτοις γὰρ ἂν ἦν), οὔτ' εἰς τὸ εἶναι, μὴ ἐνυπάρχοντά γε τοῖς μετέχουσιν. The criticism Aristotle expresses against Plato's theory of Forms in chapters 4 and 5 of book M of the *Metaphysics*, repeats almost literally (with the exception of the presence of Speusippus' and Xenocrates' doctrines) that of chapters 6 and 9 of book A (on the minor differences between the books see Annas 1976: 131-132).

¹⁴¹ That ontological priority is in question appears to be confirmed by the middle, which 'lays stress on the conscious activity, bodily or mental participation, of the agent' Smyth (1956: 392) 1728. Accordingly, it is the role, or, better, the contribution that τὰ πρότερα make to τοῖς ὕστερον which is absent. See Bonitz (1870), which translates the middle συμβάλλεσθαι as 'conferre', to bring together or to contribute.

essential. With respect to Plato's Forms, Aristotle emphasises that they do not offer any contribution to the sensibles *because* they do not seem to bear *any causal function* for their understanding.¹⁴² More specifically, Forms do not seem to be the cause of their movement,¹⁴³ of their knowledge,¹⁴⁴ of their essence,¹⁴⁵ nor their material cause (lit. the cause ἐξ οὗ).¹⁴⁶ Hence, as Forms do not contribute anything to the sensibles, there is no need to suppose their existence. Accordingly, in Aristotle's report of Plato's account, the (ontological) priority of Forms over the sensibles is explained by the causal role the former exert on the latter.¹⁴⁷ Aristotle challenges precisely this point by pointing out that such inferential procedure from simple entities we perceive with our senses to more complex entities is unjustified because the supposed causal activity performed by Forms on sensibles cannot be acknowledged.¹⁴⁸ This works fine as far as Plato is concerned. But what about the objects populating Speusippus' world? As previously highlighted, Aristotle denies that Speusippus' mathematical objects perform causal activities.¹⁴⁹ This is important because it means that the major critique Aristotle addresses to Plato in M5, and related to the causal activities of Forms, cannot be at stake in the passage under analysis. Moreover, unlike Plato, Speusippus did not posit the existence of Forms, or, more generally, of items whose existence Aristotle would not recognise. Accordingly, the issue cannot be limited to a complaint about a false inferential procedure:¹⁵⁰ for Aristotle would easily agree on the existence of all items present in Speusippus' ontology. Hence, Speusippus' mistake must be acknowledged on different grounds.

One thing to note is that items referred to in Aristotle's examples coincide precisely with

¹⁴² For a positive account of causal activities exerted by Forms beyond formal and paradigmatic causality, see Fronterotta (2008) and the studies listed at pp. 16-17. For a broader view on Plato's theory of Forms, see the papers collected in Fronterotta and Leszl (2011).

¹⁴³ Arist., *Metaph.*, 1079b14-15.

¹⁴⁴ Ivi, 15-17.

¹⁴⁵ Ivi, 17-23.

¹⁴⁶ Ivi, 23-24. In the following lines (1079b25-1080a11), Aristotle will also criticise the role Forms play as paradigmatic (or final) causes, as οὐσίαι of sensible things, and the theory of causality exposed in the *Phaedo* (99e-105c), possibly considering Forms as efficient causes. For a more recent analyses of the issues related to universals and, more specifically, to the problems created by Plato's postulation of Forms see the papers collected in Charadonna and Galluzzo (2013: 139), most of which address specific problems arising by Plato's Forms and Aristotle's related criticism.

¹⁴⁷ As well as their separability (χωρίς), but the issue will be touched upon shortly, as separation and priority are strictly related in Aristotle's account. For an analysis of Plato's ontological hierarchy as arranged according to the rule of 'prior-posterior' and grounded in the principle of συναρπεῖν καὶ μὴ συναρπεῖσθαι, see Ferrari (2015) and (2016).

¹⁴⁸ As Castelli (2013) synthetically resumes: 'Aristotle's criticism of Platonic Forms is mainly directed against two precise points: the ambiguous ontological status of Forms and their role as causes'.

¹⁴⁹ This aspect will be investigated in more detail in Chapter 3.

¹⁵⁰ Or it can, but only to a certain extent, namely as it represents the starting point of Aristotle's criticism. Cf. Crubellier (1994: 495): 'ce que nous percevons de la nature nous donne l'exemple de *liaisons causales ordonnées et intelligibles*, et l'on peut donc s'attendre qu'il en soit ainsi pour le réel dans sa totalité (y compris les êtres qui échappent à notre expérience)' (my emphasis).

those listed in Aristotle's list of Speusippus' οὐσίαι; except for the One, we find, in the same order: number, magnitudes, the soul, and explicitly listed here, sensible bodies. The correspondence and coherence between the two lists can thus confirm a) that the items populating Speusippus' world (sensibles included) are indeed those identified in the Z2 passage; b) that the One, unless considered as the first number, should be excluded by the list of Aristotle's οὐσίαι. Accordingly, a clearer picture starts to emerge: Aristotle is here acknowledging an ontological hierarchy between the items populating Speusippus' world but does not find reasons for such a cardinal ordering. Indeed, Aristotle's reference to an order of priority and posteriority *and* the correspondence of the items listed with those mentioned in Speusippus' list of οὐσίαι confirm that what is at stake here is an *ontological* hierarchy. The supposition is substantiated by Aristotle's example: Aristotle explains that even if number would not exist, magnitudes would not cease to exist. The same example is deployed further: even if magnitudes would not exist, soul and sensible bodies would still exist. The example is crucial because it recalls that used by Aristotle in his explanation of prior and posterior in Δ11, where Aristotle defines things which are prior in nature and substance (κατὰ φύσιν καὶ οὐσίαν) according to the possibility to be without (εἶναι ἄνευ):

Τὰ μὲν δὴ οὕτω λέγεται πρότερα καὶ ὕστερα, τὰ δὲ κατὰ φύσιν καὶ οὐσίαν, ὅσα ἐνδέχεται εἶναι ἄνευ ἄλλων, ἐκεῖνα δὲ ἄνευ ἐκείνων μή· ἢ διαίρεσει ἐρήσατο Πλάτων.

Some things, then, are called prior and posterior in this sense; others in respect of nature and substance, i.e. those which can be without other things, while the others cannot be without *them* — a distinction which Plato used.¹⁵¹

In the passage, Aristotle establishes a connection between priority in nature, or in substance, and ontological independence, or the *capacity to be without*.¹⁵² As Aristotle phrases the connection in this context, in order for A to be ontologically prior to B, (i) A can be without B, while (ii) B cannot be without A. Scholars disagree as to how this 'capacity to be without' should be interpreted¹⁵³ and as to whether the premises are both necessary in order to cause

¹⁵¹ Arist. *Metaph.* Δ11, 1019a1-4, transl. Ross.

¹⁵² The scholarly discussion on the topic of ontological priority and how it should be related to ontological separation is extremely lively. As the topic would require a more detailed analysis, in the present context it will be impossible to cover the bibliography exhaustively. In a recent paper, before advancing her own view, Katz (2017: 26-40) does a very good job in enabling a clear understanding of the main points of discussion and highlighting the reasons for scholarly disagreements. Accordingly, my analysis will largely rely on Katz (2017) and Katz (2013) for the main points of clarification on the issue.

¹⁵³ As Katz (2017) clearly explains, the two main interpretative decisions amount to establishing (a) the meaning of the verb εἶναι in 'the capacity to be without'; and (b) the independence relation expressed by 'the capacity to be without'. On the standard view (a) εἶναι is taken to have an *existential meaning* (see, e.g. Fine 1984; Witt 2003 and Makin 2003); and (b) the relation of independence is taken to be *modal* (as implication of being, i.e., for B to be ontologically dependent on A is for A to be a *necessary condition* for B). However, these are not the only possible interpretations; for example, the meaning of the verb εἶναι can be taken as *essential* (i.e. 'being what something is', see, e.g. Peramatzis 2011: 13), and (b) the relation of independence can be taken to be 'cause of being'.

ontological separation.¹⁵⁴ However, what scholars generally agree on is that for ontological priority to obtain *both conditions are individually necessary and jointly sufficient*: namely (i) A's ontological independence from B, *and* (ii) B's ontological dependence on A. But in [FR. 86], Aristotle's example establishes that in Speusippus' world, the various ontological levels do not even satisfy the necessary (and hence, neither the sufficient) conditions for ontological priority to obtain. Let us take the first part of the example. Aristotle says: μή ὄντος γάρ τοῦ ἀριθμοῦ οὐθὲν ἦττον τὰ μεγέθη ἔσται.¹⁵⁵ Indeed, the individually necessary condition for A (i.e. mathematical number) to be prior to B (i.e. magnitudes), is (i) A's ontological independence from B *and* (ii) B's ontological dependence on A. But Aristotle states precisely the opposite: if number ceased to exist, none the less magnitudes would exist. Accordingly, the individual necessary condition for B to be ontologically dependent on A is not satisfied, because B *is not ontologically dependent* on A. But if one of the two necessary conditions for ontological priority is not satisfied, it is impossible to meet the sufficient condition for ontological priority at all. Accordingly, mathematical number does not satisfy the conditions to be ontologically prior to magnitudes. Nevertheless, items listed in the passage do satisfy the condition for weak ontological *separation*: namely, the ontological independence of B (i.e. magnitudes) from A (i.e. mathematical number). For Aristotle says magnitudes would still exist even if number did not. However, weak ontological separation does not imply ontological priority, as the two items can still be simultaneous. And I believe this is precisely Aristotle's point in the present passage: Speusippus' substances are ontologically isolated.¹⁵⁶ Hence, they cannot be arranged in order of ontological priority because their independence *is not* asymmetrical and fails to ground the things from which they are independent. *Contra* Plato, in Speusippus' system, causality does not grant the priority of one ontological level over the other. As Speusippus' substances are ontologically

¹⁵⁴ Either *weak* or *strong* ontological separation, (henceforth OS). In general, we can say both premises are individually necessary and jointly sufficient for strong OS, *which implies ontological priority*, but that for weak OS to obtain only (i) is sufficient. For a discussion of the topic with respect to Plato (and principles), see Menn (unpublished, Iβ4).

¹⁵⁵ I take Aristotle's formulation to be existential. For this reason, I believe the passage can be considered akin to that in Δ11, although the language of annihilation is not explicit. For similar passages with a clearer vocabulary of physical annihilation (therefore with an existential meaning), see e.g. Arist., *EE* A8, 1217b 8-16 with Trabattini's (2003: 290-293) comments; Iambl., *Protr.* 38, 11-14 Pistelli = Arist., Fr. 5 Ross.

¹⁵⁶ I owe Katz (2017: 64) the terminology of isolation. In her paper, Katz argues further that strong ontological separation (mutually entailing with ontological priority as both have the same jointly sufficient conditions but are *not* conceptually identical) allows Aristotle to deny that ontologically isolated substances as those posited by Speusippus fulfil the separation criterion for substancehood: 'Speusippus' candidate substances are independent from but *not* strongly OS from sensible substance (*viz.* for otherwise sensibles would be *dependent* on them). This allows Aristotle to rule them out from the start, since they fail to ground the kind (or kinds) from which they are independent, and so fail to fulfil the separation criterion of substancehood'. In the end, Aristotle does not question the *existence* of mathematical number or magnitudes, but their consideration as separate substances. In effect, if weak OS were a sufficient criterion for strong separation, Aristotle would be forced to admit that not only the soul and the sensibles are substances, but mathematical objects as well.

isolated, nothing accounts for their ontological arrangement.¹⁵⁷ This seems to be confirmed by the metaphor Aristotle employs, and which I will take into account briefly. Ontological levels are arranged like the episodes of a poor tragedy, and the elimination of one does not involve consequences for the rest of the system. But Aristotle's critique can be further unpacked:

a) First of all, the lack of connection Aristotle is here pointing at does not seem to be random. Aristotle provides us with a precise order of elimination, which follows the same order provided when presenting the components of Speusippus' world in the list of οὐσίαι: numbers, magnitudes, soul and sensible bodies. As this structure seems to imply a precise internal order, it is plausible to conclude Aristotle takes Speusippus' components to be organised according to different degrees of substantiality, as I had suggested in the previous section. Accordingly, in Speusippus' world, at least in the way Aristotle describes it, numbers are οὐσίαι to the highest degree (due to their eternity, apparently), and then, according to a gradual descent, magnitudes, soul and sensible bodies. But Aristotle denies Speusippus' levels can be arranged according to ontological priority-posteriority, because the independence of each level does not ground the levels it is independent from. Thus, Aristotle is telling Speusippus that although he established degrees of substantiality within his system, and although, according to this arrangement, some components are ontologically prior to others, he failed to recognise that to establish an order of priority implies some degree of *dependence* as well.¹⁵⁸ Now, the question of what sort of independence is here intended, and whether it can be fleshed out as an existential independence¹⁵⁹ of prior levels, or as the capacity not to depend on something else for their status as distinct kinds of οὐσίαι,¹⁶⁰ does not present an issue for the present analysis. For whatever interpretation of the notion of dependence we are working with here, ¹⁶¹ the conditions are not satisfied by the items of Speusippus' world.

¹⁵⁷ Isnardi Parente, on the contrary, holds that Aristotle is scarcely reliable on this point (1960: 274 and 322) and she argues that Speusippus' system relies on an internal relation of analogy. However, establishing a relation of analogy between different ontological levels, does not imply as a consequence also a necessary connection between them. Differently, Dillon (2003: 44-46) argues in favour of a generative connection of the levels for which, he admits, there is no evidence. Moreover, as he relies extensively on Neoplatonic material (Iamblichus' *DCMS* and ps-Iamblichus' *Theologumena Arithmeticae*) in order to advance his views, it is hard to challenge his interpretation on the basis of the extant Aristotelian evidence. In Chapter 2 I will argue that Aristotle needs to be taken seriously in his criticism, which is revealing of Speusippus' epistemological claims.

¹⁵⁸ In fact, the notion of dependence is, for Aristotle, crucial in order for things 'to be classified as kinds of beings; [...] it is in virtue of standing in one of these ties (viz. to be said-of and to be present-in) that non-substances and universal substances are in fact classified'. Corkum (2008: 76-77).

¹⁵⁹ As, for example, in G. Fine (1993).

¹⁶⁰ As for example, in Corkum (2008) and, to a certain extent, Peramatzis (2011).

¹⁶¹ By defining it in opposition to ontological *independence*, it can mean, e.g. (i) the incapacity for independent existence (G. Fine 1984, Witt 1989; Makin 2003); (ii) the incapacity to be what it is independently of A being

b) Moreover, the isolation of Speusippus' ontological levels is explicitly evoked by the metaphor used by Aristotle: to say that the world does not resemble the episodes of a bad tragedy, amounts to saying that the world is not constituted by a series of disconnected events.¹⁶² In *Poetics* 6, when giving a first definition of what tragedy is, Aristotle maintains that tragedy 'as having magnitude' should be 'complete in itself'. And the stress on unity and completeness is constant throughout the whole book.¹⁶³ Within this unitarian conception of the tragedy and, more specifically, of its structure,¹⁶⁴ an episodic plot is defined as that where 'there is neither probability nor necessity in the sequence of its episodes'.¹⁶⁵ But that the absence of probability and necessity in the sequence of the episodes amounts to their isolateness is explained by Aristotle while clarifying what he means by 'the plot is one'.¹⁶⁶ It is here that we find the best explanation of his metaphor:

The truth is that, just as in the other imitative arts one imitation is always of one thing, so in poetry the story, as an imitation of action, must represent one action, a complete whole (μῖς τε εἶναι καὶ ταύτης ὅλης), with its several incidents so closely connected (καὶ τὰ μέρη συνεστάναι τῶν πραγμάτων) that the transposition or withdrawal of any one of them will disjoin and dislocate the whole (μετατιθεμένου τινὸς μέρους ἢ ἀφαιρουμένου διαφέρεσθαι καὶ κινεῖσθαι τὸ ὅλον). For *that which makes no perceptible difference by its presence or absence is no real part of the whole* (ὁ γὰρ προσὸν ἢ μὴ προσὸν μηδὲν ποιεῖ ἐπίδηλον, οὐδὲν μῶριον τοῦ ὅλου ἐστίν).¹⁶⁷

what it is (Peramatzis 2011: 189); (iii) not having claim to the ontological status of a being independently of being either (or both) said-of or present-in another thing (as subject), (Corkum 2008: 77); the necessity that 'it be an essential property of x (viz. B) that it exist only if y (viz. A) does' (essentialist/existential account of dependence; K. Fine 1995: 272-273).

¹⁶² On this point, see also Katz (2017: 62), to whose reading of the metaphor I am indebted. See, as a parallel of the metaphor, also Arist., *Metaph.*, Δ10 1975b 37-1076a 2: 'those who say mathematical number is first and go on to generate one kind of substance after another and give different principles for each, make the substance of the universe a series of episodes (ἐπεισοδιώδης) (for one substance has *no influence on another* (συμβάλλεται), by its existence or non existence)', transl. Ross.

¹⁶³ Just as it is a crucial issue with respect to the world. See, e.g. Arist., *Poet.* 7, 1450b24-25: 'a tragedy is an imitation of an action that is complete in itself, *as a whole of some magnitude*' (my emphasis); or 23, 17-20: 'the construction of its plots should clearly be like that in a tragedy; they should be based on a *single action*, one that is a *complete whole in itself*, with a *beginning, middle, and end*, so as to enable the work to produce its own proper pleasure with all *the organic unity of a living creature*', (my emphasis). Note, also, that beginning, middle and end are defined by Aristotle by what comes before and after and, hence, according to a logical order of priority and posteriority (see, *Poet.*, 7, 1450b21-31). This arrangement in terms of beginning, middle and end recalls the arrangement of a *series* (Arist., *Metaph.*, Δ11, 1018b12-14): 'In respect of place, for instance, [things are prior] from being nearer to some place defined either by their nature (as for instance the middle or the end)', transl. Kirwan (1998: 44). Throughout the section, all translations of the *Poetics* are by Bywater.

¹⁶⁴ Arist., *Poet.*, 1450a38-39: the 'the first essential, the life and soul, so to speak, of tragedy is the plot'.

¹⁶⁵ Arist., *Poet.*, 1451b34-35, τῶν δὲ ἀπλῶν μύθων καὶ πράξεων αἱ ἐπεισοδιώδεις εἰσὶν χεῖρισται· λέγω δ' ἐπεισοδιώδη μῦθον ἐν ᾧ τὰ ἐπεισόδια μετ' ἄλληλα οὐτ' εἰκὸς οὐτ' ἀνάγκη εἶναι. As Finkelberg (2006: 62) puts it: 'in Aristotle's unflattering characterization, the episodic plot in one in which the unity of action is diluted, as it were, in a succession of single episodes which do not follow the strict logic of cause-and-effect relationship'; also, Garrett (2014: 1): episodic plots are those which 'violate the strict formal economy of tragedy'.

¹⁶⁶ Arist., *Poet.*, 8, 1051a16: μῦθος δ' ἐστὶν εἷς.

¹⁶⁷ Arist., *Poet.*, 8, 1451a30-35.

It is clear that, even in this context, Aristotle's criticism evokes the two aspects we have encountered in [FR. 86]: independence (or isolation), and an arrangement according to an order of priority and posteriority. A tragedy which accomplishes the condition of a *complete whole* has a structure whose parts are closely connected; they are so closely connected that not only the removal, but also the *transposition* of one, would affect the whole system. On the contrary, parts which can be removed from the plot without affecting the whole, are isolated, or disconnected episodes. Once again, Aristotle confirms that the independence or dependence of an item can be established on the basis of the consequences arising from its suppression. If the whole is not affected, it means that the items removed are isolated, and not related to the rest. For otherwise, even the transposition of an item from one place of the plot would affect the whole. Accordingly, the isolation of Speusippus' levels implies disconnection between them, and such a disconnection cannot account for a precise order of the structure, let alone account for an order established in terms of degrees of substantiality.

c) Lastly, it must be highlighted that, at the beginning of the fragment, Aristotle addresses the criticism to *some* components in particular, namely, to all number and mathematical objects (ὁ ἀριθμὸς πᾶς καὶ τὰ μαθηματικά). For Aristotle says that, if we press Speusippus further on all number and mathematical objects, we realise that they do contribute nothing the one to the other. Initially, Aristotle's criticism appears to be expressed specifically with reference to numbers and mathematical objects. But in the latter part of the testimony, the objects under attack seem to be much less clearly identifiable. And in fact, the terminology does not help to clarify the issue. Aristotle first identifies the problematic topic as related to 'all number and the objects of mathematics'. Then, when extending his criticism by appeal of an example, Aristotle speaks of 'number' and 'magnitudes'; and, lastly, when he refers back to Speusippus' position in general, he says 'τοῖς τὰ μαθηματικά μόνον εἶναι φασκόμενοις', i.e. those who say that mathematical objects alone exist. Accordingly, Aristotle's terminology fluctuates between: 1) ὁ ἀριθμὸς πᾶς καὶ τὰ μαθηματικά, all number and mathematical objects (in general);¹⁶⁸ 2) ὁ ἀριθμὸς and τὰ μεγέθη, number and magnitudes; 3) τὰ μαθηματικά, mathematical objects.¹⁶⁹ As already emphasised, Aristotle's terminology is rarely consistent when related to

¹⁶⁸ See Hussey (1991: 107): 'Aristotle takes it for granted throughout M 1-3 that there are such things as 'mathematical objects' (in particular, numbers and geometrical figures), and that they are not straightforwardly identical with any entities of a more ordinary kind', and Mueller (1970: 157).

¹⁶⁹ This seems to be confirmed by the language Aristotle employs in books M and N. See Crubellier (1994: 334) 'Les objets géométriques sont appelés 'genres postérieurs au nombre' (viz. τῶν ὕστερον γενῶν τοῦ ἀριθμοῦ) par référence au programme platonicien (Même type de désignation dans A9, 992b13: τὰ μετὰ τοὺς ἀριθμούς)'.
 22

Speusippus' mathematical ontology and, because of this, it is hard to find a conclusive explanation. In particular it is difficult to understand what τὰ πρότερα τοῖς ὕστερον refers to, given that they are expressed in a neuter plural. For they could equally refer to (1) τὰ μαθηματικά, or to both (2) ὁ ἀριθμὸς πᾶς καὶ τὰ μαθηματικά. Does Aristotle refer to (1) the relation that mathematical objects in general entertain with non-mathematical levels, or is he pointing at (2) an internal relation of mathematical objects to one another? Although a definitive answer to this question cannot be provided at this stage of the analysis, I believe that an explanation which points to a separation of the mathematical level intended as a whole in relation to that of sensible bodies, rather than at an internal relation which mathematical objects entertain to one another, is more attractive.¹⁷⁰ Indeed, it is also worth noting that the soul and sensible bodies are referred to together. This, on the one hand, might be easily explained by reference to a principle of economy in the explanation provided by Aristotle. As Aristotle has already provided a full example, although he needs to show the consequent implications, he does not need to reiterate the full description of how the elimination works at every level. On the other hand, though, matching together the soul with sensible bodies, and distinguishing them from the mathematical realm, maintains a certain attractiveness from a philosophical point of view. For, even in Aristotle's own hylomorphic system, it would be much less intuitive to say that, by eliminating the soul, sensible bodies would still exist. Indeed, if mathematical objects maintain a certain degree of separability even in Aristotle's own conception, although being inseparable from the objects themselves, the same cannot be said for (almost all) sensible bodies.¹⁷¹ Indeed, the claim that by eliminating the soul, sensible bodies would still exist, is a much easier claim to counter, if this was really Speusippus' formulation. In any case, I will leave this question open, for the moment.¹⁷²

Hence, according to our analysis, Aristotle's passage conveys the following information about Speusippus' system:

¹⁷⁰ For a more detailed treatment of Aristotle's criticism of Platonists' geometrical objects (and potential criticism involved here), see Crubellier (1994: 338-343).

¹⁷¹ This consideration obviously does not take into account soulless bodies such as rocks and pebbles, which, anyway, receive a marginal treatment in Aristotle's own corpus and respond to a different reason for their unity.

¹⁷² Also Crubellier, in his commentary (1994: 496), raises the question of how the thesis of mathematical number alone would lead to an episodic conception of the whole reality. His answer touches very closely my suggestion: 'On le conçoit facilement pour ce qui est de la connexion entre les nombres et les phénomènes naturels, puisque cette these a précisément été adopté en rupture avec la doctrine primitive des idées, qui pensait trouver dans les objets idéaux des causes pour les objets naturels'. In this respect, Annas' comments on the passage are, on the contrary, not very helpful, as she limits herself to the general claim that Aristotle's criticism suggests that 'the Academy had not in fact said anything very definite', and to the observation that 'one theory is criticized on the grounds that all the mathematical objects are produced disconnectedly, i.e. there is no rational way in which the earlier contribute to the later' (1974: 209).

a) Speusippus' components of the world appear to be arranged according to different degrees of substantiality (or, at least, this is how Aristotle spells out the arrangement). Within this arrangement, Aristotle identifies, in order of degree of substantiality, the following components: numbers, magnitudes, soul and sensible bodies.

b) Aristotle's criticism specifically addresses two aspects of Speusippus' system that are connected: priority in substance and ontological isolation of the levels. As the components of the world are arranged according to different degrees of substantiality, they should also be connected to one another for the order to subsist. But this is precisely what is absent in Speusippus' conception, which by contrast, features distinct levels which are separated. For Aristotle the two things, taken together, are contradictory: the isolation and disconnection of the levels do not allow a consideration of the objects according to an order of substantiality. For, for A to be prior to B, B must somehow be dependent on A.

In order to verify the results just obtained, we can test our outcomes against another Aristotelian version of the same charge, preserved in book Λ of the *Metaphysics*.

[FR. 52] οἱ δὲ λέγοντες τὸν ἀριθμὸν πρῶτον τὸν μαθηματικὸν καὶ οὕτως ἀεὶ ἄλλην ἐχομένην οὐσίαν καὶ ἀρχὰς ἐκάστης ἄλλας, ἐπεισοδιώδη τὴν τοῦ παντὸς οὐσίαν ποιοῦσιν (οὐδὲν γὰρ ἢ ἑτέρα τῇ ἑτέρᾳ συμβάλλεται οὐσα ἢ μὴ οὐσα) καὶ ἀρχὰς πολλὰς· τὰ δὲ ὄντα οὐ βούλεται πολιτεύεσθαι κακῶς. οὐκ ἀγαθὸν πολυκοιρανίῃ· εἷς κοίρανος ἔστω.

Those who maintain that mathematical number is primary, and that, in like manner, [there is] always another substance which follows and that [there are] different principles for each [substance], make the substance of the universe episodic (for one substance in no way affects another by existing or non-existing) and establish many principles. But beings don't want to be governed badly: 'the rule of many is not good; let one be the ruler'.¹⁷³

As it is immediately evident, the passage does not preserve information on the components of the world themselves. Indeed, with the exception of mathematical number, defined as primary, other components are not spoken of explicitly. On the contrary, Aristotle speaks of the substance of the universe (τὴν τοῦ παντὸς οὐσίαν), and of another οὐσία always following mathematical number with its respective principle (ἀεὶ ἄλλην ἐχομένην οὐσίαν καὶ ἀρχὰς ἐκάστης ἄλλας).¹⁷⁴ From the vocabulary used, which repeatedly insists on the aspect of

¹⁷³ Arist., *Metaph.*, Λ10, 1075b37-1076a5. The last sentence is a quotation of Hom., *Il.* II, 204. The earliest manuscripts omit ἔστω from the quotation (see Berti 2017: 549).

¹⁷⁴ Note that the insistence on the continuity of the οὐσίαι occurs also in Z2 with respect to Xenocrates (ἐνιοὶ δὲ τὰ μὲν εἶδη καὶ τοὺς ἀριθμοὺς τὴν αὐτὴν ἔχειν φασὶ φύσιν, τὰ δὲ ἄλλα ἐχόμενα). I take the accent on the

substantiality, we can conclude that, as suggested before, mathematical number and the items following it should be considered as the οὐσίαι populating Speusippus' ontology. Moreover, the hint of a continuous succession of οὐσίαι following mathematical number seems to confirm that the components of Speusippus' world are in fact arranged according to an order, and that the order should be understood in terms of degrees of substantiality. Once again, the mathematical level is the focus of Aristotle's criticism. However, from the passage under examination it seems clearer that Aristotle's charge does not concern internal relations within the mathematical level *only*, but, on the contrary, the relation *each* level entertains with others. Indeed, both Homer's quotation at the end of the fragment, as well as the general context of the discussion of Λ,¹⁷⁵ point to the absence of a unique governing principle of the whole. And this is specifically evident for Speusippus' conception, *which features principles for each level*. By contrast with the previous passage, the criticism here does not address specifically the question of the relation of the components in terms of priority and posteriority, but, instead, it concentrates on their reciprocal disconnection, justified by reference to the peculiar principles each level features. However, the criticism is formulated almost in the same way: just as Aristotle had said: 'τὸ μὴθὲν συμβάλλεσθαι ἀλλήλοις τὰ πρότερα τοῖς ὕστερον', in the present passage he says 'οὐδὲν γὰρ ἢ ἑτέρα τῇ ἑτέρᾳ συμβάλλεται οὔσα ἢ μὴ οὔσα'. In this respect, one may also note that the relation that Aristotle would want to establish between the components, and that he stresses as absent in Speusippus' conception, is here spelled out by appeal to the same verb εἰμί: in nothing one thing affects another by being or not being. Accordingly, the fragment confirms our main points: a) Speusippus' world is populated by a variety of components, among which mathematical number is the first, and which, in Aristotle's perspective, are arranged according to an order of substantiality; b) the different levels are neither connected to one another, nor ordered according to a unique governing principle, but each of them has specific principles. Moreover, c) the fragment also helps us clarify Aristotle's criticism further. It is the way Speusippus accounts for the independence of each ontological level, namely, by establishing specific principles ruling over *each* level, that makes Aristotle conclude that his levels are *independent* and his system episodic. Given that

continuity expressed here by 'ἀεὶ ἄλλην ἐχομένην οὐσίαν' to pick up the reference to 'τὴν τοῦ παντὸς οὐσίαν'. Accordingly, the οὐσίαι Aristotle speaks of are considered ontologically consequent to one another and, so to say, they do not interrupt the substance of the universe. In this sense, ontological continuity does not imply connection, but only the existence of an order. This insistence on continuity is shared also by Theophrastus (see *infra*, footnotes 135-136).

¹⁷⁵ Cf. Zingano (2010: 141-142) 'Book Lambda endeavours to establish that there is *sunaphē tis kai hoion koinōnia pros allēla tois te noētois kai tois tēs phuseōs*, "a sort of connection and as it were a common ground between objects of reason and the things of nature", so that they are not disconnected *hōsper hekatera kechōrismena*, "as if each was separated", to quote twice from Theophrastus' *Metaphysics* (2, 4a9-12; see also Lambda 10, 1075a16 *panta de suntetaktai pōs*, "all things are ordered together somehow"), a treatise which seems to be very close to Lambda'. On the context of book Λ, see, among *alia*, the papers collected in Frede and Charles (2000) and the collection of Horn (2010a). On Λ10 more specifically and the unity of the world-order, see Horn (2010b).

the mathematical level originates out of different principles than those established for the geometrical one, the suppression of the mathematical level would have no effect for geometrical objects; for magnitudes would still originate out of their principles even if all numbers were to be destroyed. This aspect leads Aristotle to describe Speusippus' system as a series of disconnected episodes. Accordingly, Aristotle's criticism is directed at *every* level and does not regard the mathematical realm internally only; on the contrary, he points at the absence of a unique relation ordering the levels between each other. By establishing peculiar and unrelated principles for each ontological level, Speusippus gave away the possibility of an ordering continuity in the system.

1.3 The rejection of Forms (fr. 77)

In order to conclude our sketch of a general framework of Speusippus' ontology, one final aspect stands in need of our attention: the rejection of Plato's theory of Forms. Indeed, in books M and N of the *Metaphysics*, but also often elsewhere in the *corpus*, Aristotle presents the positions of Plato, Speusippus and Xenocrates together. Each of the three positions is characterised by a peculiar feature: beyond the sensibles, Plato posited the existence of Forms (and numbers); Speusippus posited the existence of mathematical number alone; and Xenocrates brought together Forms and numbers. But in at least one passage, Aristotle gives an explicit rationale for Speusippus' position and for his decision to posit mathematical objects only:

[FR. 77] οἱ μὲν γὰρ τὰ μαθηματικὰ μόνον ποιοῦντες παρὰ τὰ αἰσθητά, ὁρῶντες τὴν περὶ τὰ εἶδη δυσχέρειαν καὶ πλάσιν, ἀπέστησαν ἀπὸ τοῦ εἰδητικοῦ ἀριθμοῦ καὶ τὸν μαθηματικὸν ἐποίησαν.¹⁷⁶

Those who posit the objects of mathematics only besides sensible things, because they saw the difficulty and artificiality regarding the Forms, abandoned Ideal number and posited mathematical number.

In the passage, Aristotle suggests that Speusippus' decision to establish the existence of mathematical number only, beside sensible things, is motivated by the difficulty and artificiality he observed in Plato's theory of Forms. Unfortunately, Aristotle does not explain what Speusippus' specific problems in relation to Plato's theory were, and the vocabulary used here is the only tool at our disposal to grasp the philosophical difficulties. Accordingly, we

¹⁷⁶ Arist., *Metaph.* M9, 1086a2-5. It is worth noting, here, that the expression 'παρὰ τὰ αἰσθητά', present in fr. 48 IP₁ as well, here occurs again. In the present fragment, however, it seems that Speusippus concedes the existence of mathematical objects only, beyond that of sensible bodies. This conclusion strengthens the suggestion, raised in section 1.2 that the main intervention in Speusippus' system is that between the mathematical realm and the sensible one.

will investigate the terms δυσχέρεια and πλάσις.

The word δυσχέρεια is commonly used by Aristotle to refer to logical difficulties.¹⁷⁷ From this perspective, it is not absurd to think that part of Speusippus' problem with Plato's theory of Forms was related to those discussions taking place already within the Academy, and which Aristotle himself raised;¹⁷⁸ it certainly did not come as a surprise to Speusippus that specific contradictions could be raised against the Forms, especially concerning their relation to sensible objects. But if the word δυσχέρεια is quite common in Aristotle's prose, things get more interesting once we address the term πλάσις. Indeed, the substantive πλάσις is not common at all in Aristotle's corpus, where it occurs only once, in the biological context of the *Generation of Animals*.¹⁷⁹ In that context, Aristotle is speaking about the production of milk in women and its usefulness. The passage explains that although, in the months preceding the seventh month, milk is used for the formation of the embryo, when the embryo is approaching completion, the residue of secretion is more in quantity because it is not used for the *moulding* of the embryo (εἰς πλάσιν τοῦ ἐμβρύου) anymore, but, rather, for its small growth (εἰς μικρὰν αὔξησιν). In this respect, the term points specifically to the *conformation* and *shaping* that the embryo is undergoing until the seventh month. In absence of other occurrences of the substantive, we can broaden our scope with a brief survey of the usage of the corresponding verb. Indeed, the general use of the verb πλάσσω, employed by Aristotle especially in his biological works, confirms that the usual meaning refers to the moulding of

¹⁷⁷ On Aristotle's use of the term as 'theoretical difficulty' in philosophical contexts, see Bonitz (1870: 210), who records 15 uses of the word as 'philosophical difficulty' (*idem quod ἀπορία* and ἀτοπία) and Cheng (2018), who provides a survey of δυσχερ- in both Plato and Aristotle and offers an explanation of the process of objectification of the word. As Cheng argues (2018: 99-100): 'δυσχερ-words are suitable for expressing the embarrassing and uncomfortable state of someone who is puzzled by sophistic arguments in which semantic polysemy and ambiguity play a considerable role'. Then, Plato and Aristotle seem 'to "purify" the sophistic δυσχέρεια bringing it from the field of *antilogia* to the Socratic *elenchus* and the Aristotelian dialectic'. For a parallel analysis of the semantic development of the term ἀπορία, see Politis (2006). Cheng's analysis also aims at questioning the results obtained by Schofield (1971), who closely associated the word δυσχέρεια with Speusippus. See below, n. 178.

¹⁷⁸ As, for instance, Arist. *Metaph.*, A9; B2; *An. Post.* I, 22. In a very influential article, Schofield (1971) argued that Aristotle's frequency (especially in books M and N of the *Metaphysics*) in using the word δυσχέρεια in the sense of 'ἀπορία raised by Speusippus in the Academic debates on first principles' (ivi: 14) suggests that the word can be claimed as Speusippean. The paper has been very well received by scholars and opened the path for a lively discussion on the identification of οἱ δυσχερεῖς in Plato's *Philebus*. Despite the challenges raised by Tarán (1981: 79-80) and D. Frede (1992: 51; 1993: 461), Schofield's identification of οἱ δυσχερεῖς has been defended by Dillon (2003: 67-76 and 1999: 104-105); Tarrant (2010: 111-112) and (2008), where Tarrant argues for an analogous identification of οἱ δυσχερεῖς in the *Magna Moralia*; more recently, Murgier (2016: 74-78). For different positions, see Bringmann (1972), who suggests Heraclides lies behind the reference (this identification, however, has been strongly questioned by Brancacci 1999) and Warren (2009) who shows how Aristotle in *NE* drew on a previous discussion between Speusippus and Eudoxus, probably lying in the background of Plato's *Philebus*. For a recent attempt to reconstruct the debate, see Fronterotta (2018).

¹⁷⁹ Arist., *De gen. anim.*, 776a34.

material objects or matter in general, which leads to the acquisition of a determinate shape.¹⁸⁰ By transposing the results of this brief survey to the context of our analysis, it seems fair to conclude that the second part of Speusippus' problem with the theory of Forms is related to the way the theory is *conceived* and *shaped* by Plato. But this result seems to be unsatisfactory, given that Speusippus abandons the Forms completely and refuses the existence of ideal number as well, instead of re-shaping the doctrine. For Speusippus does not construct a different theoretical framework for the Forms, as, for instance, Xenocrates does. What does it mean, then, that he had observed the *πλάσις* of Plato's theory?

In order to obtain a better understanding of the meaning of *πλάσις*, here two examples of the Aristotelian usage of the verb *πλάσσω* in polemical contexts come to our aid. Let us examine them more closely. The first occurs in the *De gen. et corr.*,¹⁸¹ where Aristotle criticizes Leucippus for having constructed a hypothesis according to which reality is partly divisible and partly isn't. He says:

Εἰ μὲν γὰρ πάντα διαιρετόν, οὐδὲν εἶναι ἓν, ὥστε οὐδὲ πολλά, ἀλλὰ κενὸν τὸ ὅλον· εἰ δὲ τῇ μὲν τῇ δὲ μή, **πεπλασμένῳ** τινὶ τοῦτ' εἰκέναι.

For, if it is divisible through and through, there is no one, and no many either, but the whole is void; while to maintain that is divisible at some points but not at others, looks like an **arbitrary fiction**.¹⁸²

The reasons for Aristotle to say that Leucippus' hypothesis resembles an arbitrary fiction are explained in the following lines: 'Arguing in this way, they were led to transcend (*ὑπερβάντες*) sense-perception, and to disregard (*παριδόντες*) it on the ground that one ought to follow reason'.¹⁸³ And again: 'Moreover, although these opinions appear to follow logically, yet to believe them seems next door to madness when one considers the facts'.¹⁸⁴ Therefore, Leucippus' theory is arbitrary because it is constructed in such a way that it goes *beyond sense perception* and *does not work in accordance with the facts*. In the passage, the reasons for Aristotle's criticism are rooted in a strong empiricism: Leucippus' hypothesis is artificial,

¹⁸⁰ See, e.g., *De gen. anim.* 764a15, where Aristotle considers two animals already moulded in embryo, one of which has all the parts of the female, while the other of the male; 730b30, where nature is depicted as a modeller who works the material with her own hands. *De Hist. An.* 623b32; 624a1; 624a2; 624a19, all related to the construction of cells by bees or similar insects; 628a 12; 628b 11 where wasps mould their combs; *De part. Anim.* 654b29, 657a20, 676b10 where the verb refers, respectively, to the moulding of an animal out of a clay; to the material needed for the formation of ears; to the elements moulded in snakes into a certain form. For a complete account of the references, see Bonitz (1870: 597), who translates: *formare, fingere* (and, accordingly, when abstract: *configere, comminisceri*).

¹⁸¹ Arist., *De gen. et corr.* 325a8-10, transl. Joachim.

¹⁸² Translation by Joachim. Italian translations of the *De gen. et corr.* also go in the same direction: Giardina (2008: 162) translates *πεπλασμένῳ* with 'artificioso', while Migliori (2013: 75) 'arbitrario'.

¹⁸³ Arist., *De gen. et corr.* 325a13-15, transl. Joachim.

¹⁸⁴ Arist., *De gen. et corr.* 325a17-19, transl. Joachim.

because, according to Aristotle, it completely overlooks reality. The same can be said for the second example, taken from the *De motu animalium*. For, when Aristotle is speaking about the joints of the animals, he observes that they work differently than in geometrical illustrations:

καὶ γὰρ τὸ κινεῖσθαι, ὥς φασί, πλάττουσιν ἐπ' αὐτῶν· οὐ γὰρ κινεῖσθαι τῶν μαθηματικῶν οὐδέν.

For movement, too, in such figures is a figment, so they say, since in mathematics nothing actually moves.¹⁸⁵

Once again, Aristotle contrasts what we can observe in accordance with our senses and what, by contrast, we cannot. Indeed, when we speak of movement in a mathematical or geometrical context, we are not describing a real pattern detectable in nature, but, rather, a fictitious one. If we take the two examples to be relevant, we have a much clearer view of Speusippus' concerns: on the one hand, the theory of Forms was problematic because of logical difficulties, well attested by various passages of Aristotle's *corpus* and possibly discussed already by Plato within the Academy; on the other hand, the theory of Forms also had an empirical disadvantage: the existence of Forms is not easily discernable by empirical analysis and necessitates a stronger metaphysical claim. With the elimination of Forms and of ideal number, Speusippus claimed the advantage of dealing with ontological levels that were unanimously acknowledged in their existence by reducing the metaphysical dimension drastically.

1.4 Speusippus' ontology: preliminary conclusions

This preliminary examination of the general features of Speusippus' system gives us some starting points for the following investigation. According to the Aristotelian passages analysed so far, we can conclude that:

- a) Speusippus belongs to that group of philosophers who established the existence of many substances beyond sensible bodies and, according to Aristotle, arranged them according to different degrees of substantiality.
- b) The list of Speusippus' οὐσίαι includes: mathematical number, magnitudes (the two are possibly joined together as τὰ μαθηματικά), soul and sensible bodies. According to what Aristotle says, each οὐσία presents specific principles. Although it is difficult to establish precisely to what extent Speusippus actually shares

¹⁸⁵ Arist., *De motu animalium*, 698a25-26, transl. Peck.

Aristotle's conception of οὐσία, the existence of different principles for each level suggests that each level has specific characteristics which distinguishes it from the others. Moreover, as mathematical number appears first in the list because it is considered the *first among beings*, the list implies an order in terms of priority and posteriority. However, it may well be that the order implied in Speusippus' arrangement follows a different rationale than Aristotle's, as, for example, a difference in terms of ontological progression.¹⁸⁶ Nonetheless, there is some way in which mathematical number, or mathematical objects, are prior to other components.

c) The arrangement according to degrees of substantiality or, better, the relation in terms of priority and posteriority, implies, for Aristotle, that the different ontological levels should be connected to one another. Despite an arrangement which features an internal relation of priority and posteriority, for Aristotle, the isolation of the levels that fails to account for an order among them.

d) The fact that Speusippus' establishes different principles for each ontological level makes Aristotle conclude that Speusippus' levels not only fail to account for their arrangement and order but are also disconnected.

e) Lastly, Speusippus seems to identify two kinds of problems in Plato's theory of Forms: on the one hand, a problem related to logical difficulties involved in Plato's account; on the other hand, an empirical disadvantage that leads Speusippus to reject ideals in his system (ideal number included) in favour of a more empirical realism.

¹⁸⁶ This is the suggestion of Isnardi Parente (1980: 268ff), which seems quite plausible to me. As mathematical number is conceived of as the first among beings, the following levels might be explained as a 'progression in terms of being'. This, however, should not be understood as a scale of reality. On the contrary, it is quite clear that the Academics considered numbers as real entities, existing by themselves, and not as abstracted ones (see also Crubellier (1994: 353-354), who argues that this is the overall theory which Aristotle is trying to invalidate). Accordingly, the 'progression in terms of being' should be understood as a progressive (and not derivative) deployment of reality, which is also, to a certain extent, empirically comparable.

CHAPTER TWO:
THE ABSENCE OF GOOD IN THE PRINCIPLES:
SPEUSIPPUS' RE-THINKING OF PLATO'S THEORY OF FORMS

As we discussed in the previous chapter, in *Metaphysics* M (9, 1086a 2-5) Aristotle reports that Speusippus, having seen the ‘δυσχέρειαν καὶ πλάσιν’ of Platonic Forms, abstained from positing ideal number and posited mathematical number alone. In the same book (M 8, 1083a 21-22), Speusippus is said neither to believe in Forms absolutely nor as certain numbers. Accordingly, as argued, it is plausible to say Speusippus raised at least two different types of problems to Plato's Forms: on the one hand, logical difficulties concerning the account of Forms; on the other hand, possibly, a difficulty justified by, or rooted in, a more empirical approach. But how do these problems relate to one another? And what *precisely*, were the philosophical reasons for Speusippus to abandon the theory of Forms?

In this chapter, I shall argue that Speusippus' postulation and conception of first principles works as a direct response to the Platonic problem of participation to the Forms. Indeed, Speusippus' analytical conception of principles, conceived as causes but released from ontological grounding in the sensibles, allows an inquiry and taxonomical arrangement of sensible objects that does not require any appeal to Forms. To this purpose, the chapter will be organised as follows. As a starting point, I will take into account Aristotle's criticism of Speusippus' conception of principles. I will show that a specific aspect of this criticism, i.e., that directed towards the absence of Good in the principles, allows us to better understand Speusippus' conception of the principles within its relation to the Platonic problem of participation. Against traditional readings of the passage, I will argue that the biological analogy of the principle with the seed, often thought to originate with Speusippus, rather reflects an Aristotelian critique against Speusippus' theory, originally conceived with reference to first principles only.¹⁸⁷ Accordingly, I will show that if we take participation to

¹⁸⁷ Ravaisson (1838: 75). Merlan (1953: 97 and 105-106) takes the seed to be, for Speusippus, both a simile and a metaphor of the principles. In the first edition of the fragments (1980: 275), Isnardi Parente is unclear on the attribution of the comparison. She writes that Zeller follows Aristotle's text closer than other scholars, by attributing to Speusippus the argument based on the seed, but she also writes that the fragment, better than biological and organic comparisons, gives us the idea of how Speusippus conceived the progressive mathematical-geometrical development of reality fulfilled in the *tetraktys*. In the second edition (2005: 16), she comments that the argument based on the seed is typically Aristotelian, but she does not expand her analysis further. Tarán (1981: 335-336) says that the analogy between seed and ἀρχή is typically Speusippean; Dillon (2003: 42-43) allows the possibility that Aristotle may be tendentious here but seems to agree that the comparison with the seed was indeed Speusippean; Bonazzi (2015: 16) and Trabattoni (2017: 150) agree that the analogy with the seed is Speusippean.

have represented for Speusippus at least one of the problems of Plato's doctrine of the Forms, we are provided with a coherent explanation for his decision to separate different levels of reality. Under these circumstances, the discontinuity of the system works as an attempt to guarantee different kinds of inquiries, and, therefore, of different kinds of knowledge related to different kinds of objects. If this reading is right, the usual charge of episodicity, unfairly dismissed by scholars,¹⁸⁸ would expose Speusippus' aim to fix Plato's metaphysical doctrine. The 'truly episodic universe', labelled by Dillon as an 'anathema to a Platonist',¹⁸⁹ might constitute, on the contrary, a genuine attempt by a leading Platonist to restore Platonic theories by defending them from inconsistencies and contradictions.

2.1 What is most beautiful and noble does not exist ἐν ἀρχῇ (fr. 53)

In many passages of *Metaphysics* N (see, e.g. N4 1091a30ff; 1091b13ff), Aristotle explains that Speusippus chose not to characterise the first principle, τὸ ἔν, as (the) good. On some occasions, Speusippus' justification is associated with his worry about ascribing 'badness' to the second principle.¹⁹⁰ Technically, this operates on the assumption that 'badness' is opposite to 'goodness' and that the first two principles must be opposed to one another; if one principle is to be good, the second (τὸ πλῆθος) must necessarily be characterised as bad. But on at least two occasions, Aristotle reports seem to hint at a more general theory. Indeed, the first example occurs in Λ:

[FR. 53] ὅσοι δὲ ὑπολαμβάνουσιν, ὥσπερ οἱ Πυθαγόρειοι καὶ Σπεύσιππος τὸ κάλλιστον καὶ ἄριστον μὴ ἐν ἀρχῇ εἶναι, διὰ τὸ καὶ τῶν φυτῶν καὶ τῶν ζώων τὰς ἀρχὰς αἷτια μὲν εἶναι τὸ δὲ καλὸν καὶ τέλειον ἐν τοῖς ἐκ τούτων, οὐκ ὀρθῶς οἴονται. τὸ γὰρ σπέρμα ἐξ ἐτέρων ἐστὶ προτέρων τελείων, καὶ τὸ πρῶτον οὐ σπέρμα ἐστὶν ἀλλὰ τὸ τέλειον. οἷον πρότερον ἄνθρωπον ἂν φαίη τις εἶναι τοῦ σπέρματος, οὐ τὸν ἐκ τούτου γενόμενον, ἀλλ' ἕτερον ἐξ οὗ τὸ σπέρμα.

Those who hold, as the Pythagoreans and Speusippus, that what is most beautiful and noble does not exist ἐν ἀρχῇ — for although the principles of plants and animals are causes, beauty and completeness are in the things arising out of them — don't think correctly. In fact, the seed arises out of other prior and complete things, and what is primary is not the seed but completeness. e.g. we must say that before the seed there is a man — not the man arisen out of the seed, but another from whom the seed arises out of.¹⁹¹

¹⁸⁸ Dillon (2003: 44-45) suggests a generative system, but, as already mentioned, he admits the absence of sufficient textual evidence for his interpretation. However, in a footnote (n. 40, p. 44) Dillon mentions Malcom Schofield's suggestion that Speusippus 'may in fact have left his universe episodic'. Isnardi Parente (1980: 59) recurs to the notions of ὁμοιότης and analogy, in order to account for some continuity in Speusippus' system, as does Tarán (1981: 26).

¹⁸⁹ Dillon (2003: 46).

¹⁹⁰ See, e.g. Arist., *Metaph.* N4, 1091b30-35.

¹⁹¹ Fr. 53 IP₁ (=Arist., *Metaph.* Λ7, 1072b30-1073a3). The translation is mine, but it is worth mentioning that both Tredennick (1935: 150-151) and Ross (1984: 176-177) translate 'ἐν ἀρχῇ' with 'in the beginning' and 'τὰς ἀρχὰς' with 'beginnings'.

Aristotle here exposes a compact, general theory attributed to Speusippus and the Pythagoreans, according to which: ‘what is most beautiful and noble does not exist in the beginning’. Already an initial glance at the Greek reveals an ambiguity: the thesis here reported is unclear. Indeed, the sentence can be understood as:

- a) ‘what is most beautiful and noble does not exist in the beginning’, i.e., beauty and nobility are posterior in time;
- b) ‘what is most beautiful and noble does not exist in the principle’, i.e., beauty and nobility are posterior ontologically.¹⁹²

As the two readings are grammatically equivalent,¹⁹³ in order to understand what meaning we should assume to be operative, we need to look at the rest of Aristotle’s testimony. Indeed, Aristotle adds an expansion and explanation of the thesis: ‘although the principles of plants and animals are causes, beauty and completeness are *in* the things arising out of them (ἐν τοῖς ἐκ τούτων)’. The expansion of the thesis focuses on specific kinds of principles, those of animals and plants, connoted as causes. Even though these principles are causes, however, beauty and completeness can be found only in the things arising out of them, i.e., in their consequents, or products: plants and animals. The sentence states once again the posteriority in appearance of qualities such as beauty and, now, also completeness, but does not help to clarify in what sense this posteriority should be understood. In fact, the bearing of qualities such as beauty, nobility, and completeness is expressed only with the verb εἶναι and an indirect complement, constructed with ἐν plus the dative, expressing the presence of qualities in an object, i.e., in the things arising out of the principles of plants and animals (ἐν τοῖς ἐκ τούτων). Up to this point, we are still dealing with both theses: the posteriority of beauty and completeness can be either ontological or temporal. It is here that Aristotle presents his refutation, consisting in a counterexample showing that Speusippus’ thesis is

¹⁹² The possibility of both readings is confirmed as well by commentators of the passage, who take the sentence either way. Accordingly, pseudo-Alexander of Aphrodisias, *In Arist. Metaph.*, p. 699, 28-33 Hayduck = fr. 49 IP, understands that it is not possible to say that the principle is good, while the Latin translation of Themistius’ paraphrase of *Metaphysics* Λ (*In Metaph. Libr. L Paraphrasis*, p. 24, 24-32 = fr. 42c Tarán) reports ‘initio rei’, giving a temporal reading to ‘ἐν ἀρχῇ’. Even by objecting that the Latin version of the text is a translation from the Hebrew and, as such, cannot be used as conclusive evidence, the temporal reading can also be detected from the meaning of the passage. Indeed, the noun ‘res’ implies that the object in question is a generated ontological being (identified, in fact, with the seed), while the formulation ‘tempore perfectionis’ alludes to its temporal development.

¹⁹³ It has been noted by other scholars that Aristotle sometimes accommodates both ontological *and* temporal priority in some passages of his corpus see, e.g. Crubellier (1994: 539), with respect to Arist., *Metaph.*, N5 1092a9ff; Corkum (2008: 69) with respect to Arist., *Phys.*, 260b17-19, where Aristotle, in relation to motion (κίνησις), says there is *also* temporal priority in addition to priority in substance; more relevant is the case of *Metaph.* Θ8 where Aristotle, with the focus on the three relations falling under the potential–actual scheme, proves the logical, ontological and temporal priority of the act.

not correct. The counterexample reads that the seed arises out of other prior things, and, therefore, that the seed is not prior, but *completeness* is. Aristotle goes on to add that, in fact, before the seed there is a man — not the man arisen out of the seed, but, rather, another man from whom the seed arises out of. The counterexample provided indicates the ontological priority of completeness:¹⁹⁴ the seed, considered in relation to its final end, man, *is* in potency. But, as we know, actuality is prior to potentiality ontologically. Therefore, it is man, a complete substance¹⁹⁵ in its actual form, that comes first. But is Aristotle's refutation legitimate? In order to establish this, we need to look at Aristotle's report more carefully, evaluating the reliability of the thesis attributed to Speusippus, and providing possible hidden premises assumed by Aristotle in his confutation.

Accordingly, the thesis attributed to Speusippus consists of three different premises:

- (i) What is most beautiful and noble does not exist in the principle/in the beginning.

¹⁹⁴ One might object that temporal priority is sufficient to explain the counterexample, without any need to recur to ontological priority as well. In the end, Aristotle himself, in *Metaph.* Θ8, when demonstrating the priority of actuality over potentiality, says that actuality is, in time, 'sometimes prior and sometimes not' (*Metaph.* Θ8, 1049b11-12). Nevertheless, this objection fails to underline two important points of Aristotle's counterexample which show that both ontological and temporal priority are at play here. On the one hand, in *Metaph.* Θ8 Aristotle goes on explaining that: 'the matter and the seed and the thing which is capable of seeing, which are potentially a man and corn and seeing, but are not yet so actually, are prior in time to the individual man and corn and seeing subject which already exist in actuality', (Arist., *Metaph.* Θ8, 1049b19-23, transl. Tredennick). Accordingly, if the completeness at stake is that of the individual man, or the individual corn, completeness, and therefore actuality, is posterior in time, while the seed is prior. And this seems exactly the mistake Aristotle is pointing out at by saying that: 'before the seed there is a man', but 'not the man arisen out of the seed'. On the other hand, one might object that in the same example, Aristotle specifies that 'prior in time to these potential entities are other actual entities from which the former are generated; for the actually existent is always generated from the potentially existent by something which is actually existent—e.g., man by man, cultured by cultured—there is always some prime mover; and that which initiates motion exists already in actuality', (Arist., *Metaph.* Θ8, 1049b24-27). However, the reasons for this meaning of temporal priority seem to be at least compatible with Aristotle's explanation of ontological priority. Indeed, Aristotle says that actuality is prior in substantiality '(a) because things which are posterior in generation are prior in form and substantiality; e.g., adult is prior to child, and man to semen, because the one already possesses the form, but the other does not; and (b) because everything which is generated moves towards a principle, i.e. its end' (Arist., *Metaph.* Θ8, 1050a4-10). For this reason, I believe it is appropriate to take into consideration both kinds of priority. Moreover, to consider both ontological and temporal priority seems to be particularly appropriate in relation to the passage under examination. Indeed, even if temporal priority were to be sufficient, from an Aristotelian perspective, to demonstrate Speusippus' theory is wrong, we must not forget that the thematisation of a distinction between different kinds of priorities is specifically Aristotelian and does not apply to Platonists in general, nor to Speusippus in particular.

¹⁹⁵ The example has been accounted for in many ways by scholars, who have interpreted the 'man' Aristotle refers to very differently. Most commentators understand the claim with an existential meaning, and I tend to agree with such interpretations (i.e. the man spoken of is an individual existing man) because, in similar accounts 'Form or actuality is the end toward which natural processes are directed. Actuality is therefore a cause in more than one sense of a thing's realizing its potential' (Cohen 2006). Makin (2006: 193-194) goes in a similar direction and (2003: 226-227) argues that such examples of ontological priority are to be understood in view of teleological considerations. Accordingly (2006: 195): 'Fs are prior in substance to Gs so long as there is some process which in normal conditions results in Fs rather than Gs; whereas the way to get Gs rather than Fs is to interfere with, interrupt, or hinder that process'. Similarly, Witt (1994: 222ff). Peramatzis (2011: 284) rejects the existential construal as problematic and offers an explanation based on *Physics*, 2.9, 200a7-10; 19-20, aimed at explaining the example by appeal to a parallel with the existential dependence of matter upon form: 'if an adult, a human or a form *exist* or *are going to exist* at later or completion stages of certain types of generation process, the relevant types of child, seed or matter *must exist* or *will have to exist* (respectively) at earlier stages of these processes'.

- (ii) Principles (of plants and animals) are causes.
- (iii) Beauty and completeness are in the things arising out of the principles.

2.2 Premise (i): what is most beautiful and noble does not exist in the principle/in the beginning (τὸ κάλλιστον καὶ ἄριστον μὴ ἐν ἀρχῇ εἶναι)

Similar versions of premise (i) recur quite often in other passages of Aristotle's *Metaphysics*, and more precisely, in *Metaphysics* N4 1091a29ff; N4 1091a36-b3; N5 1092a9-17. As the discussion of N4 and N5 will be taken into account specifically in section 2.6, for the sake of the present discussion, it is not necessary to analyse in detail each *testimonium* within its context. It is worth saying, though, that in all the other contexts the thesis is expressed more specifically with reference to first principles in general, or to the One in particular. Indeed, in N4 1091a31-32, Aristotle takes into account an aporia related to how the *elements*¹⁹⁶ and *first principles* are related to the Good and the Beautiful ('πῶς ἔχει πρὸς τὸ ἀγαθὸν καὶ τὸ καλὸν τὰ στοιχεῖα καὶ αἱ ἀρχαί') in order to understand whether 'any of the these (viz. the elements and the principles) is such as we mean when we speak of the Good or the Supreme Good, or whether, on the contrary, these are later in generation than the elements (ὕστερογενῆ)'.¹⁹⁷ In N 4 1091a36-b3, following on the same topic, Aristotle speaks of an agreement between the mythologists and other thinkers of his time, 'who deny that there is *such an element* (viz. conceived as the Good or as the Supreme Good), and say that it was only after some evolution in the natural order of things, that both the Good and the Beautiful appeared (προελθούσης τῆς τῶν ὄντων φύσεως καὶ τὸ ἀγαθὸν καὶ τὸ καλὸν ἐμφαίνεσθαι)'; in the same respect, Aristotle comments that, in his opinion, 'the difficulty arises not from ascribing goodness *as belonging to the first principle* (ἢ δυσχέρεια οὐ διὰ τὸ τῇ ἀρχῇ τὸ εἶ ἀποδιδόναι ὡς ὑπάρχον)', suggesting that, indeed, this was the difficulty experienced by Speusippus.¹⁹⁸ Lastly, in N5 1092a9-17 Aristotle says that Speusippus is not right in his assumption when he likens *the principles of the universe* to *the principle of animals and plants* (τὰς τοῦ ὅλου ἀρχὰς τῇ τῶν ζώων καὶ φυτῶν), on the grounds that out of indeterminate and incomplete things always arise things that are more complete (ἐξ ἀορίστων ἀτελῶν τε αἰεὶ τὰ τελειότερα).¹⁹⁹ It is in this context that the example of the

¹⁹⁶ Relevant here, is also that Speusippus characterised his principles as elements (see, e.g. fr. 58 IP₁).

¹⁹⁷ Arist., *Metaph.* N4 1091a33-35, transl. Tredennick (1933: 285), slightly modified.

¹⁹⁸ Arist., *Metaph.* N4 1091b2-3, transl. Tredennick (1933: 287). I am not alone in taking the good as a qualitative attribution. Indeed Crubellier's translation (1994: 520) goes precisely in the direction of explicitly characterising the attribution of the good to the One as the attribution of a quality: 'Mais à vrai dire la difficulté ne vient pas de ce que l'on attribue le Bien, comme une qualité, au principe, mais de ce que l'on fait de l'Un un principe – et un principe au sens d'«élément»', (my emphasis).

¹⁹⁹ (=fr. 57 IP₁) This last passage requires closer inspection, especially in its connections to the fragment here examined. Such an examination will be dealt with in section 2.6. For the moment, I will limit my comments to a brief observation about the terminology, which strongly emphasises the vocabulary of the τέλος. Indeed, the vocabulary of the τέλος is extremely relevant with respect to the seed example, as it will become clearer in the

seed appears once again; indeed, Aristotle concludes: ‘for even in the natural world the principles from which these things are derived are perfect and complete — for it is man that begets man; the seed does not come first’.²⁰⁰

This brief comparison of different versions of premise (i) already provides us with crucial information for our enquiry.

First of all, premise (i), asserting the absence of qualities such as beauty and goodness, seems to have a specific target: it does not concern *any* kind of principles, but *primary* ones. However, Aristotle does not specify this in [FR. 53] and, for the moment, we cannot exclude that the premise equally applies to other kinds of principles. Secondly, the reference to two qualities, beauty and goodness, is consistent across all testimonies, while the reference to completeness appears only twice, and always concurrently with the counterexample of the seed. Lastly, Aristotle hints at one reason for providing such premise. Indeed, by stating that the difficulty (ἡ δυσχέρεια) ‘arises not from granting that goodness [τὸ εὖ] belongs to the ἀρχή’,²⁰¹ Aristotle provides us with crucial information: the reason for Speusippus’ thesis lies precisely in the problematic assumption of qualities as belonging to the principles. If we cannot still opt for an ontological or temporal reading of the thesis, we are at least provided with some evidence in favour of the former.

2.3 Premise (ii): principles (of plants and animals) are causes (τῶν φυτῶν καὶ τῶν ζῴων τὰς ἀρχὰς αἷτια μὲν εἶναι)

Premise (ii): ‘principles of plants and animals are causes’, is generally considered by scholars to be genuinely Speusippean.²⁰² However, although the biological analogy can be considered coherent given both the importance granted by the philosopher to inquiry into the sensibles²⁰³ and Aristotle’s testimony about the postulation of many οὐσίαι and of correspondent principles, I think there are reasons to doubt the attribution and suspect an Aristotelian intervention.²⁰⁴

next stage of my analysis.

²⁰⁰ For the sake of completeness, I here report the Greek: ‘εἰσὶ γὰρ καὶ ἐνταῦθα τέλειαι αἱ ἀρχαὶ ἐξ ὧν ταῦτα· ἄνθρωπος γὰρ ἄνθρωπον γεννᾷ, καὶ οὐκ ἔστι τὸ σπέρμα πρῶτον’, Arist., *Metaph.* N5 1092a15-17, transl. Treddenick (1933: 291).

²⁰¹ Transl. Menn (unpublished, Iy3: 40).

²⁰² See, e.g. Tarán’s discussion of fr. 42a and 43 (1981: 334-339, Tarán’s numeration), but also Ravaisson (1838:72) Dancy (1991: 85-86); Bonazzi (2015: 16); Trabattoni (2016: 150-151).

²⁰³ See fr. 123-146 IP₁ on the ὅμοια.

²⁰⁴ At the conference *Metaphysics and Epistemology in Plato’s Academy* (Durham, 21-22 February 2018) Thomás Bénatouil suggested that the biological analogies and the example of the seed could receive a separate treatment. Accordingly, one could still doubt premise (ii) is genuinely Speusippean, but nonetheless consider the example as employed by Speusippus. I thank Thomás Bénatouil for the suggestion, as it had never occurred to me the possibility to consider the two separately. However, as we realised, by accepting the seed-example

First of all, also in Z2, where Aristotle had introduced Speusippus' system, he states that: 'Speusippus posited still more kinds of substances, beginning with the One, and principles for each kind of substance, one for numbers, another for spatial magnitudes, and then another for soul'.²⁰⁵ Although Aristotle is here taking into consideration people who believed that there are several kinds of οὐσίαι beyond the sensibles (παρὰ τὰ αἰσθητά), sensibles recur explicitly in Aristotle's list of Plato's οὐσίαι, but not in Speusippus'. It is also true that Aristotle introduces Speusippus' list by saying that he posited *still more* kinds of substances, but when it comes to saying that he also established principles for each kind of οὐσία, sensibles do not appear anymore. Moreover, the correlative set ἄλλην μὲν - ἄλλην δέ,²⁰⁶ followed by the ἔπειτα (which suggests a sense of conclusion), seems to indicate that the list of principles is exhausted.²⁰⁷ Thus, even if we accept that Speusippus' considered sensible bodies to be included among the οὐσίαι,²⁰⁸ we have no evidence suggesting he actually posited principles for them as well, nor that he posited principles *of plants and animals* specifically.²⁰⁹ Indeed, if this was a genuine Speusippean formulation, I see no reason for Aristotle not to include it in his list. Secondly, the expression occurs in a very similar way ([ἀρχή] τῶν ζώων καὶ φυτῶν) in another context, namely, in the above quoted testimony (N5 1092a 9-17) in which it appears

as Speusippean we are provided with a generative model for the production of consequents from principles. But this does not square with other Aristotelian evidence, where Aristotle insists Speusippus did not account for the production of items out of principles.

²⁰⁵ FR. 48 IP₁ (=Arist., *Metaph.* Z2, 1028b21-23). For a more detailed analysis of this fragment, see, *supra*, section 1.1.

²⁰⁶ See, for a parallel example of two options that exhaust the list, Arist., *De gen. et corr.*, 326b2-6: εἰ δ' αὐτὸ αὐτὸ ἕκαστον, ἢ διαιρετὸν ἔσται, κατ' ἄλλο μὲν κινεῖν κατ' ἄλλο δὲ κινούμενον: 'but, if each is its own mover either it will be divisible, in part causing motion and in part being mover', transl. Forster and Furley.

²⁰⁷ The grammatical evidence is not meant to be conclusive, but only to work as a suggestion. Indeed, although it is possible to read the ἔπειτα as indicating conclusion, it may well be that it is the topic that is concluded, and not the list (as in Bonitz (1870: 266): ἔπειτα 'in enumerandis argumentis' or 'fort complectitur quae antea dicta sunt'). Also, parallel versions of ἄλλος μὲν - ἄλλος δέ followed by ἔπειτα are hard to find. A working parallel could perhaps be [ps-Xen.], *Ath. Const.* Indeed, in enumerating the various 'leaders of the people' in a longer list, [ps-Xen.] seems to arrange the order internally according to shorter chronological periods (introduced by μετὰ δὲ ταῦτα, εἴτα and others). At *Ath. Const.* 28.2.7-10, [ps-Xen] says: 'μετὰ δὲ ταῦτα τοῦ μὲν δήμου προειστῆκει Ξάνθιππος, τῶν δὲ γνωρίμων Μιλτιάδης, ἔπειτα Θεμιστοκλῆς καὶ Ἀριστείδης· μετὰ δὲ τούτους Ἐφιάλτης μὲν τοῦ δήμου, Κίμων δ' ὁ Μιλτιάδου τῶν εὐπόρων'. However, the same construction at 62.2.1-3, where [ps-Xen.] is listing the pay for different services, shows that the sense of conclusion is not necessary, as the list continues (μισθοφοροῦσι δὲ πρῶτον ὁ δῆμος ταῖς μὲν ἄλλαις ἐκκλησίαις δραχμὴν, τῇ δὲ κυρίᾳ ἐννέα <ὀβολούς>· ἔπειτα τὰ δικαστήρια τρεῖς ὀβολούς· εἴθ' ἡ βουλὴ πέντε ὀβολούς). A closer working parallel could perhaps be Procl., *In Parm.*, 1, 707, 40 - 708, 7, where exactly same construction with ἄλλος is used. 'Δεῖ τοίνυν ἐπὶ πάσης τάξεως τῶν πραγμάτων νοεῖν ἐνάδα μὲν ἐξηρημένην ἄλλην, ἐνάδα μετὰ τοῦ πλήθους ἄλλην, ἔπειτα οὕτω τὸ πλῆθος καθ' αὐτὸ μὴδὲ μετέχον τῆς οικείας ἐνάδος, οὐχ ὅτι ἐστὶ τι τοιοῦτον ἐν τοῖς οὐσίαις, ἀλλ' ὅτι καὶ τοῦτο πρὸς τὸ παρὸν εἰς νοῦν βαλέσθαι διὰ τὴν τοῦ Ζήνωνος δόξαν ἀναγκαῖον'.

²⁰⁸ An interpretation that, as I emphasised in section 1.1, I am inclined to accept.

²⁰⁹ In general, evidence regarding principles other than primary is extremely scanty. For the present purpose, it is important to note that in the fragments preserved by Athenaeus, namely those bearing witness of Speusippus' enquiry into the sensibles, there is no mention of principles at all. Also relevant is Theophrastus' testimony (*Metaph.*, 6b 4-6): 'of the heavens and the rest they make no further mention whatsoever. And likewise, neither do those around Speusippus', transl. Gutas (2010: 126-127). Quoting Gutas' commentary (2010: 311): 'The reference to Speusippus is incontestably negative: what Theophrastus means is precisely that those about Speusippus [...] do not explain how 'the lower entities can be derived from the principles assumed' (van Raalte 264). This is the theme of this entire Aporia, that some philosophers posit the principles and then stop without explaining the derivation of everything else from them'.

concurrently with the counterexample of the seed. The consistency in speaking of *principles of plants and animals* in polemical contexts in which the counterexample of the seed is introduced as a counterdemonstration, makes me suspicious. Accordingly, I think we should keep open as a possibility that such principles are introduced precisely *in order to* refute Speusippus' claims. In the end, parallels with other evidence have shown that the thesis: 'what is most beautiful and noble does not exist in the principle/in the beginning', usually addresses primary principles, and not those of animals and plants. Indeed, I think that the example of *principles of plants and animals* is functional for Aristotle to introduce his counterexample of the seed and point out a flaw in Speusippus' system. Lastly, the example of the seed is widely used by Aristotle in many passages of his corpus, where it is not unusual that Aristotle speaks of seeds of plants and animals²¹⁰ and considers them to be principles.²¹¹ What is even more relevant is that the seed is the *exemplum princeps* in Aristotle's demonstration of the ontological priority of actuality over potentiality, a topic that is particularly connected to the fragment under analysis [FR. 53], as will be clear from the following considerations. To conclude, what I consider to be genuinely Speusippean of premise (ii) is only the claim that principles are causes.

2.4 Premise (iii): Beauty and Completeness are in the things that arise out the principles (τὸ δὲ καλὸν καὶ τέλειον ἐν τοῖς ἐκ τούτων)

Lastly, thesis (iii) seems to me the natural continuation of premise (i). As beauty and completeness are not *in* the principle/*in* the beginning, they will be shown in the things *arising out* of the principles. If, from this perspective, premise (iii) can be considered genuinely Speusippean, I believe the change in terminology would be significant. Indeed, as we noted above, given that the cluster of properties such as beauty, nobility and goodness is constant in similar versions of premise (i),²¹² completeness always appears in the testimonies in second place, and before the introduction of the seed example.²¹³ In this respect, the shift

²¹⁰ See, e.g. Arist., *Phys.*, I 7 190b1-190b4; II, 8 199b8-199b9; *De an.* I, 2 405b2-405b4, with reference to Hippo: 'they seem to have argued from the fact that the *seed of all animals* is fluid' (italics is mine), transl. Smith. In a different context, but similarly about Aristotle speaking of σπέρμα of plants, see Abraham (2010: 278-279). One issue here is obviously related to the ambivalence of the Greek term σπέρμα, translatable both with 'seed' and 'semen' according to the contexts. Indeed, when we are speaking of σπέρμα as semen, it is even more common for Aristotle to speak about it as the male principle as opposed to the female principle, sometimes referred to as σπέρμα as well. On this, see Lefebvre (2016), whose discussion of Bolton (2010) and of the significance of ἐξ οὗ in this specific biological context is also relevant.

²¹¹ One passage of *Magna Moralia* is particularly relevant here. Even though the authenticity of the text is widely debated, it can be taken at least as a plausible position that derives from Aristotle's thought: 'Every natural kind is given to begetting a being like itself, i.e. plants and animals; for both are apt to beget. And they are given to beget from their first principles— for instance, the tree from the seed; for this is a kind of principle', Arist., *Mag. mor.* 1 10, 187032-34, transl. Stock.

²¹² Arist., *Metaph.* N4, 109130ff; N4 1091b13ff; N5, 1092a9-17.

²¹³ Arist., *Metaph.* N4, 1091a30ff.

from goodness and beauty to completeness²¹⁴ would indicate the imposition of Aristotelian teleology. Indeed, these two qualities do occur in Platonic dialogues as paradigmatic examples of Forms,²¹⁵ and it is not unusual for Aristotle, when criticising Plato's Theory of Forms, to take into account the Form of Good.²¹⁶ If Aristotle seems to be less interested in arguing against the Form of Beauty,²¹⁷ there are at least two passages, respectively in the *Eudemian Ethics* and in *Metaphysics* M in which Aristotle mentions the two qualities together, apparently referring to the Platonists.²¹⁸ Although not conclusive, I take the evidence to allow the possibility that the passage shifts from an Academic discussion of (the) Good and (the) Beauty to Aristotle's own notion of the τέλος.²¹⁹

2.5 The counterexample of the seed

As noted above,²²⁰ the possibility of both readings of [FR. 53] is confirmed by ancient commentators of the text who read Aristotle's 'ἐν ἀρχῇ' in two ways. But apart from allowing different interpretations of Speusippus' theory, I believe that the effectiveness of Aristotle's confutation lies precisely in the ambiguity of the text. In order to test this supposition, it is worth examining Aristotle's argument. Aristotle's argument consists in a simple counterexample: a) The seed arises out of other prior and complete things; b) What is prior is not the seed, but completeness. Ultimately, the refutation drops its reference to the principles and concentrates on the ontological priority of completeness. But as it is immediately clear, the argument lacks certain premises. Accordingly, in order to advance

²¹⁴ I take ἄριστον, as the superlative of ἀγαθός, to belong to the same discussion of the latter. Tarán notes (1981: 335) that the two superlatives are here also related to the context, as Aristotle himself ascribes them to the unmoved mover. I leave aside the question of the moral connotation of such qualities, that would require a separate and detailed analysis of Speusippus' ethical doctrines. This aspect is rightly noticed by Trabattini (2016: 148-155) who underlines that these qualities are, in a Platonic context, also ethically connoted, and explains possible advantages of Speusippus' thesis.

²¹⁵ The most important examples are, for the Form of Good, *Republic* VI, 508e1ff; for that of Beauty, *Symp.*, 210eff.; *Phaed.* 78d-e. Both Forms occur, within different discussions, in the *Republic*.

²¹⁶ For Aristotle's criticism of the Form of Good, see, e.g. Arist., *EN*, 1096a34-b 5, *Metaph.* N 4, 1091b25ff.

²¹⁷ Although there are some scholars working in this direction, trying to show Aristotle's engagement with Plato's discussions in the *Symposium*. See, e.g. Sheffield (2010).

²¹⁸ In *EE*, Aristotle criticises the Platonists for having built an argument that is, so to say, upside down. Indeed, they demonstrate the goodness of things that are agreed to be good, on the basis of arguments that would themselves need further justification. Aristotle comments that 'they ought to start with agreed [goods], such as health, strength, and temperance, [in order to show] that the beautiful (τὸ καλόν) is present even more in unchanging things'. Arist., *EE*, 1, 1218, 21-22, transl. Woods (1992: 10), slightly modified. In *Metaphysics* M (3, 1078a 30- 1078b 7), Aristotle draws a distinction between goodness and beauty and concludes that 'inasmuch as it is evident that these (I mean, e.g. orderly arrangement and definiteness) are causes of many things, obviously they must also to some extent treat of the cause in this sense, i.e., the cause in the sense of the Beautiful.', transl. Tredennick. Although Aristotle will never return on the topic, Annas highlights that 'an early marginal comment refers us to his discussion and transcription of Plato's *On the Good*', Annas (1976: 151).

²¹⁹ It must be highlighted, here, that in *Metaph.* N5 1092a 9-17, where the thesis occurs again together with the example of the seed, the formulation seems to be completely reframed within the language of the τέλος. Under these circumstances, the thesis: 'ἐξ ἀορίστων ἀτελῶν τε αἰεὶ τὰ τελειότερα' could be read as a paraphrase of Speusippus' thesis under Aristotelian conceptualisation. This will be examined in more detail in section 2.6.

²²⁰ See, *infra*, footnotes 192 and 193.

his counterexample, Aristotle would appear to be assuming that, for Speusippus:

- I. The principle of plants and animals is the seed.
- II. Plants and animals are the τέλος of the seed.

These two premises effect a conceptual shift from Aristotle's original presentation of Speusippus' thesis to the introduction of the counterexample. Aristotle's objective is, indeed, to show that Speusippus wrongly supposed that:

- III. The seed is a principle.²²¹

But in order to state that the seed is a principle (III.), Aristotle needs to accommodate a possible temporal reading of thesis (i), stating that: 'what is more beautiful and noble does not occur in the beginning'. In the end, Aristotle would probably agree with Speusippus that substances are complete and show their completeness at their stage of actuality and, thus, completeness is posterior *in time*.²²² But what Aristotle is trying to show is that Speusippus naively assumed that what is prior *in time* is also *ontologically* so. Moreover, the conceptual shift is well hidden: empirical comparisons make it easy to accept that the principle of plants and animals is the seed (I.), and that, accordingly, the seed's fulfilment will precisely be individual plants and animals (II.). Furthermore, to consider individual plants and animals as the fulfilment (or τέλος) of the seed, allows a consideration of the seed as the potential state of animals and plants. Even if Aristotle himself would somehow agree with this conclusion, the counterexample shows that this is true only if we think of the actual state as posterior to the potential state *in time*. This points out at another (supposed) problem with Speusippus' ontology: in Aristotle's eyes, Speusippus' principles look deficient. Indeed, the biological example points out that even though principles are characterised as causes, they lack the formal requirements in relation to the objects they cause.²²³ In Aristotle's biology, the τέλος works as an intrinsic cause:²²⁴ the seed can be considered as the cause of a specific

²²¹ Or, better, that Speusippus' principle is wrongly conceived as a seed.

²²² At least in one sense. See *infra*, n. 195-195.

²²³ This critique closely recalls that addressed by Aristotle to Plato as well, regarding the impossibility for the Forms to exert (various kinds of) causal activities into this world. The bibliography on the topic is extremely rich and it is obviously impossible to be covered here appropriately.

²²⁴ I am aware of the complications implied in the ontological consideration of the τέλος, or final cause. For a thorough analysis of such difficulties and a critical discussion of the main interpretations of Aristotelian teleology, see Quarantotto (2001: 329-365) and Johnson (2005: 15-39). For an account of the final cause within biological processes, see Gotthelf and Lennox (1987: 199-286), Quarantotto (2005), Johnson (2005: pp. 131-294 specifically, on *Teleological explanations in natural science*) and Leunissen (2010). Leunissen distinguishes two types of teleological causation; the primary type amounts to the 'realization of a preexisting, internal potential (or perhaps "potentials") for form through stages shaped by conditional necessity' (4) and is 'responsible for the coming to be and presence of those features that can be exhibited to be the necessary

kind of οὐσία, but it will not become *that* man (or *that* animal, or *that* plant) because of extrinsic agents acting on it.²²⁵ But it is precisely the decision to take into account principles *of plants and animals* and not other kinds of principles that facilitates the introduction of the counterexample. Aristotle voluntarily juxtaposes different kinds of principles in order to render his claim more effective: Aristotle treats the thesis functionally, as equally applicable to all principles, while Speusippus has a referential term, first principles. Since the example takes into account plants and animals, the manoeuvre implies either the exclusion of primary principles from the discourse, or the equation of them with other sorts of principles.²²⁶ Both of these options entail the contradiction that Aristotle wants to draw: if Aristotle is here taking Speusippus' view to be universal,²²⁷ a simple and particular counterexample would be sufficient to deny it.²²⁸

Aristotle's criticism can be summarised as follows: on the one hand, Speusippus is responsible for an ingenious conception of the principles, which, in Aristotle's view, accounts for their temporal priority, but not for their ontological priority. In this respect, Speusippus' principles can be compared to a seed, which is apparently prior (and actually so, *in time*), but it is not when considered from an ontological perspective. Speusippus' conception of principles is therefore wrong because it takes temporal priority to be ontological as well. On the other hand, a second critique is closely related to this first: understood in this way, Speusippus' principles are deficient; for, although characterised as causes, they lack something that accounts for the qualities shown in their consequents. Aristotle's biological analogy shows that Speusippus' principles are unaccomplished causes, failed principles that are such only nominally. If, for Aristotle, the formal cause and his conception of natural teleology²²⁹ account for the perpetuation of patterns in the same species, the same cannot be said for Speusippus' principles. On the contrary, nothing guarantees that specific clusters of qualities can arise out of a completely unqualified

prerequisites for the performance of vital and essential functions' (209); the second involves 'a formal nature of a natural being using materials that happen to be available (usually residues that have come to be of material necessity and that are not conditionally necessitated) for the production of parts that serve the animal's well-being' (4) and is responsible for the 'presence and sometimes also for the shaping of subsidiary and luxury features that increase the well-being of living beings' (209).

²²⁵ Unless we want to consider external causes not allowing the seed to fulfil its actual state.

²²⁶ Indeed, Aristotle might point out a real flaw of Speusippus' system, if the latter was negligent in accurately distinguishing principles of different kinds. In that case, the Aristotelian polemics would appear to be fairly right.

²²⁷ With 'universal' I mean that the view holds good for all kinds of principles.

²²⁸ More simply, if Aristotle takes Speusippus' view to be valid for all kinds of principles, a particular counterexample is sufficient to contradict the view and reject it. Indeed, in order to deny that, e.g., '(all) principles are red', I just need to demonstrate that: 'one principle (or some of them) is not red'. Avoiding clarifying that Speusippus' view is qualified, makes it easier for Aristotle to contradict it and refuse it.

²²⁹ If the two can be considered separately, Arist., *GA* I.1, 715a6: ταῦτα μὲν οὖν ὥς ἐν τι σχεδόν. See, among others, Lennox (2001: 182-194) and Leunissen (2010: 12-16).

principle nor that a principle can originate qualities at all.

2.6 Another discussion on the good (frr. 58; 57)

Before concluding my analysis, it is worth testing my results once more. As mentioned, the Aristotelian passage just examined [FR. 53], finds a close counterpart in another Aristotelian testimony about Speusippus [FR. 57], located at the beginning of N5, but integrated into a longer discussion starting in N4 about the Good and the principles. As the aim of the present section is a close analysis of [FR. 53] and [FR. 57], I will touch onto the beginning of the discussion [FR. 58] only briefly.²³⁰

At the beginning of N4, Aristotle says:

[FR. 58] Ἐχει δ' ἀπορίαν καὶ εὐπορήσαντι ἐπιτίμησιν πῶς ἔχει πρὸς τὸ ἀγαθὸν καὶ τὸ καλὸν τὰ στοιχεῖα καὶ αἱ ἀρχαί· ἀπορίαν μὲν ταύτην, πότερόν ἐστὶ τι ἐκείνων οἷον βουλόμεθα λέγειν αὐτὸ τὸ ἀγαθὸν καὶ τὸ ἄριστον, ἢ οὐ, ἀλλ' ὕστερογενῇ. παρὰ μὲν γὰρ τῶν θεολόγων ἔοικεν ὁμολογεῖσθαι τῶν νῦν τισίν, οἱ οὐ φασιν, ἀλλὰ προελθούσης τῆς τῶν ὄντων φύσεως καὶ τὸ ἀγαθὸν καὶ τὸ καλὸν ἐμφαίνεσθαι (τοῦτο δὲ ποιοῦσιν εὐλαβούμενοι ἀληθινὴν δυσχέρειαν ἢ συμβαίνει τοῖς λέγουσιν, ὥσπερ ἔνιοι, τὸ ἐν ἀρχῇ· ἔστι δ' ἡ δυσχέρεια οὐ διὰ τὸ τῇ ἀρχῇ τὸ εὖ ἀποδιδόναι ὡς ὑπάρχον, ἀλλὰ διὰ τὸ τὸ ἐν ἀρχῇ καὶ ἀρχὴν ὡς στοιχεῖον καὶ τὸν ἀριθμὸν ἐκ τοῦ ἐνός).

Now, there is a difficulty, and a reproach to anyone who finds it no difficulty, about how the elements and the principles are related to the good and the beautiful. The difficulty is this: whether any of these is such as we mean when we speak of the good or the supreme good, or whether, on the contrary, these are posterior in generation. For it would seem that there is an agreement between the mythologists and present-day thinkers, who deny that there is such an element, and say that it was only after some evolution in the natural order of things that both the good and the beautiful appeared. They do this to avoid a real difficulty which confronts those who hold, as some do, that the One is a first principle. This difficulty arises not from ascribing goodness to the first principle as an attribute, but from treating the One as a principle, and a principle in the sense of an element, and then deriving number from the One.²³¹

Aristotle presents the aporia as regarding the relation entertained between τὸ ἀγαθὸν καὶ τὸ καλὸν and τὰ στοιχεῖα καὶ αἱ ἀρχαί. As underlined in the first sections of this chapter,²³² the aporia is expressed explicitly as a relation that the principles, and, specifically, primary principles,²³³ entertain with the good and the beautiful. And the question, more specifically, addresses whether any of these principles or elements is such as we mean when we speak of

²³⁰ I am aware that the whole discussion of N4, together with a detailed analysis of the objections raised by Aristotle between the two passages under analysis, would deserve a separate treatment. As this discussion, however, would represent a long digression within my analysis of Speusippus, it needs to be postponed to a different context.

²³¹ (=Arist., *Metaph.* N4 1090a31-1091b4). Transl. Tredennick and Ross, slightly modified.

²³² See, *infra*, sections 2.1-2.4.

²³³ As characterised as elements by the Academics. This aspect will be examined in more details in Chapter 6.

the good, or the supreme good, or, rather, if these are to be considered later in origin. If it seems like the focus of the discussion is narrowed down to the good only, Aristotle then takes beauty into consideration again. Indeed, it seems that there is an agreement between the theologians and other present thinkers of his time, viz. Speusippus, who deny that there is such an element and say that it is only when the nature of beings has progressed that both the good and the beautiful appeared. In this regard, I would like to highlight a few aspects of this passage which confirm some suppositions of the previous analysis and which may be of use for the next section.²³⁴

First, Aristotle speaks of an agreement between the mythologists and the thinkers of his time, who denied that there is such a principle, or element, conceived as (the) good, and established that beauty and good only appear once the nature of things has advanced. This thesis, although expressed in a different way, is still compatible with what we have identified as Speusippus' premise (i), namely: that what is most beautiful and noble does not exist in the principle. Moreover, by following Crubellier's translation of the previous sentence we read: 'est-ce que quelque chose comme ce que nous appelons le bien lui-même, ou le meilleur, fait partie des principes, ou bien, au contraire, **<ces termes>** ont-ils été produits plus tardivement' the thesis seems indeed even more familiar.²³⁵ Qualities such as good and beautiful do not exist in the principle, but they are to be found at a different stage of nature. Indeed, if we distance ourselves from the immediately generative meaning that the adjective ὑστερογενής suggests, the claim seems to be still compatible with what we have concluded until now. Qualities such as beautiful and good appear (ἐμφαίνεσθαι)²³⁶ when the nature of beings has progressed (προελθούσης τῆς τῶν ὄντων φύσεως): namely, at a different stage of nature.²³⁷ As we have already seen, Aristotle stresses insistently both the absence of an internal coherence of Speusippus' system, and the inconsistency caused by the separation of each level. In this respect, it would be at least contradictory to say that nature progresses, or, better, perfects. Accordingly, Speusippus' thesis can be enriched as follows:²³⁸ he abdicates the attribution of the qualities 'good' and 'beautiful' to the principles and conceives the good

²³⁴ I do not take my argument to be conclusive. My intention, as it will be clear from the second observation, is, rather, to highlight that the reference to qualities, to participation, and to predication is indeed at stake even in the continuation of the discussion.

²³⁵ Crubellier (1994: 518).

²³⁶ Note here that the verb does not carry any generative meaning, but only a consideration of what happens in nature.

²³⁷ Crubellier (1994: 521) also highlights that this way of quoting introduced by the *παρά* implies that we are dealing with a thesis which is not expressly professed. Accordingly, we are dealing only with the *possibility* of finding among the theologians a support.

²³⁸ See Crubellier' summary of Speusippus' thesis (1994: 516-517): 'ils renoncent purement et simplement à attribuer au principe la *qualité de «bon»*, et conçoivent le bien comme une propriété qui s'applique à certains êtres en raison des formes particulières qu'ils prennent au cours de leur développement' (my emphasis).

as a property which applies to beings at a different stage of nature.

Secondly, I would like to discuss the adjective ὑστερογενής further. Scholars²³⁹ tend to consider the reference to the theologians as genuinely Speusippean. However, I agree with Crubellier that such a supposition is not necessary, as the passage: ‘obéit quand même aux règles ordinaires de la méthode diaporématique’.²⁴⁰ In the end, the reference to theologians and poets is not something extraneous to Aristotle’s own doxographical practice which is quite generous in acknowledging the indebtedness philosophy has towards myths²⁴¹ as well as the inaccuracies of the ancient sages. In Brisson’s words, Aristotle’s practice is based on two postulates: ‘(i) there is continuity between the tradition concerning the gods and what philosophy has to say about them; (ii) nonetheless, the philosopher must distinguish the narrative from its initial basis’.²⁴² In this respect, I believe it is more natural to interpret the reference to theologians and poets as part of Aristotle’s own practice,²⁴³ rather than necessarily finding an attribution for it. But even if we want to attribute the reference to Speusippus himself, a consideration of the adjective is relevant: Aristotle might be here exploiting the reference so as to focus the attention on a generative function of the principles, which is indeed absent²⁴⁴ in other Aristotelian accounts of Speusippus, but relevant in the context of the seed-counterexample. The evocation of theogonic genealogies and the familial relationship between previous and posterior gods, in fact, promotes a vision of a principle(s) which entertains a genetic link with its consequents. It is not a case, then, that the adjective used by Aristotle, ὑστερογενής, strengthens such an idea: the beauty and the good are produced or generated secondly in time. Indeed, the genetic link established between the principles and their consequents facilitates the same critiques that Aristotle already addressed against Speusippus’ principles. It highlights 1) the impossibility that consequents can show qualities which are absent in the principles by which they are caused.²⁴⁵ And 2) it encourages a temporal reading of Speusippus’ thesis so to show that, from an ontological point of view, the claim does not make sense.

With this in mind, we can now turn to a more detailed analysis of [FR. 57] in its direct connection with [FR. 53], as analysed in the previous section. The direct relevance that the

²³⁹ Annas (1976: 213-214), Tarán (1981: n.145 p. 340).

²⁴⁰ Crubellier (1994: 521).

²⁴¹ Cf., for instance, the famous passage in Arist., *Metaph.* A, 982b11-19: ‘φιλόμυθος φιλόσοφος πῶς ἐστίν’.

²⁴² Brisson (2004: 38).

²⁴³ And so does Isnardi Parente (1980: 279)

²⁴⁴ Or even denied.

²⁴⁵ See, for example, *Phys.* II 7, 198a26-27; III 2, 202a9-12; *Metaph.* Λ3, 1070a6-9, where the same example of the seed/man is used to show the necessary identity of type between a cause and its effect.

fragment has for our discussion is justified by three features that the two passages share: 1) a critique of Speusippus' (primary) principles; 2) the reference to principles of animals and plants; 3) the model of the seed used as a counterexample against Speusippus' theory. Indeed, the first two lines represent the conclusion of the precedent discussion opened in N4: Aristotle suggested we cannot refuse to consider the first principle as good, but he didn't argue positively for it. On the contrary, the previous discussion was limited to presenting such a position as intuitively true. It is in this context that Aristotle decides that it is now worth examining again the opposite thesis, namely, Speusippus', in order to actually deal with it directly.²⁴⁶

[FR. 57] Εἰ οὖν καὶ τὸ μὴ τιθέναι τὸ ἀγαθὸν ἐν ταῖς ἀρχαῖς καὶ τὸ τιθέναι οὕτως ἀδύνατον, δῆλον ὅτι αἱ ἀρχαὶ οὐκ ὀρθῶς ἀποδίδονται οὐδὲ αἱ πρῶται οὐσίαι. οὐκ ὀρθῶς δ' ὑπολαμβάνει οὐδ' εἴ τις παρεικάξει τὰς τοῦ ὅλου ἀρχὰς τῇ τῶν ζώων καὶ φυτῶν, ὅτι ἐξ ἀορίστων ἀτελῶν τε αἰεὶ τὰ τελειότερα, διὸ καὶ ἐπὶ τῶν πρώτων οὕτως ἔχειν φησίν, ὥστε μὴδὲ ὄν τι εἶναι τὸ ἐν αὐτό. εἰσὶ γὰρ καὶ ἐνταῦθα τέλειαι αἱ ἀρχαὶ ἐξ ὧν ταῦτα ἄνθρωπος γὰρ ἄνθρωπον γεννᾷ, καὶ οὐκ ἔστι τὸ σπέρμα πρῶτον.

If, then, it is impossible both not to place the good among the principles, and to place it in this way, it is clear that the principles are neither being rightly rendered, nor are the first beings.²⁴⁷ Nor does someone suppose correctly if he compares the principles of the whole to that of animals and plants, on the ground that the more perfect things always come from those which are indeterminate and imperfect, and is led by this to assert that this holds for the first principles; so that not even the One itself is a real thing; for even in the natural world the principles from which these things come from are perfect—for it is man that begets man; the seed does not come first.²⁴⁸

Now, some preliminary general comments related to the discussion are required. First of all, diverse from [FR. 53], where Aristotle referred generally to an 'ἀρχή', Aristotle speaks here in [FR. 57] of τὰς τοῦ ὅλου ἀρχὰς. The formulation is at least bizarre, considering the critiques addressed to Speusippus and related to the disconnection of his system. Indeed, as already underlined in the previous chapter,²⁴⁹ the charge of episodicity insisted precisely on a) a hierarchical order of priority and posteriority between the various levels granted by the system and, for Aristotle, inconsistent with b) the separation of such levels. If there isn't a principle accounting for such an order, how can Aristotle speak of the principles of the whole?

²⁴⁶ See Crubellier (1994: 538-539).

²⁴⁷ I follow Annas (1976: 126) and Crubellier (1994: 538), who translate αἱ πρῶται οὐσίαι with 'primary real objects' or 'les premiers êtres'. Indeed, Crubellier notes that the distinction between primary and secondary substances is not pertinent in the context and that, rather, Aristotle means 'les premiers êtres, ceux qui apparaissent les premiers au cours de la derivation, c'est-à-dire les nombres et les objets géométriques [...]'. La phrase est intéressante parce qu'elle indique que l'objet de cette section n'est pas la conception des principes considérés en eux-mêmes, mais bien l'organisation de la série descendante entre les principes et le monde phénoménal'. Moreover, it should be highlighted that the claim that 'the principles are neither being rightly rendered, nor are they the first beings' confirms once more the supposition that the principles at stake here are primary ones and not others.

²⁴⁸ Arist. *Metaph.* N4, 1092a 11-17, Transl. Tredennick (1933: 290-291) modified.

²⁴⁹ See, *infra*, sections 1.2 and 1.3.

Moreover, how can he speak of principles of the whole, if each of Speusippus' levels presents its own principles? One solution is to understand that Aristotle is speaking of primary principles by using his own schemes. Insofar as primary, the principles would somehow need to account for the whole system. If we grant this as an explanation, we also need to bear in mind that Aristotle's presentation is, from the very beginning, transposing Speusippus' world in a different, and possibly incompatible, philosophical framework.

A second thing to highlight is the fluctuation from the plural to the singular with reference to the principles. Aristotle speaks first of '*the principles* of the whole' and then of '*the principle* of plants and animals'. Besides being inconsistent with the previous formulation of [FR. 53], where principles of plants and animals were indeed plural, Aristotle seems here to be pointing also at something else; as Crubellier notes,²⁵⁰ in the shift from a plural, τὰς τοῦ ὅλου ἀρχάς, the principles of the whole, to a singular, τῇ τῶν ζώων καὶ φυτῶν, the singular τῇ [ἀρχῇ] has to be understood in the empirical sense of 'beginning'. Therefore, the whole passage should be understood as criticising an inference about the nature of something we cannot see (the principles of the whole) starting from something we can actually see (the beginning of animals and plants).²⁵¹ Although I take Crubellier's suggestion to be essential here, I believe that this aspect can be better determined and understood, if we take a look at the verb παρεικάζω, which occurs only 7 times in the Aristotelian corpus, and often in very biological and detailed passages of the *Parva Naturalia*.²⁵² An analysis of the occurrences shows that the verb, commonly translated as 'to compare' or 'to liken', refers to a *specific* kind of comparison, or analogy, which is neither explicative nor inferential, but only *illustrative*. Let us try to make this clearer. In two of the occurrences²⁵³ the verb appears as part of a comment in a parenthetical statement which says: ὥς μέγαλῳ παρεικάζοντα μικρόν, 'to compare small things with great (ones)'. The context, is, in both cases, that of an explanation of physical phenomena (as, for example, the production of fluxes, phlegm and serum in the brain, or the explanation of the sound of thunder). In both cases the phenomenon under analysis is so 'small' that it cannot be observed directly, and Aristotle finds a parallel explanation by reference to a second ('larger') phenomenon already accounted for. Thus, the explanation is provided by reference to something we can actually observe, and then it is transposed onto the microscopic or imperceptible circumstance. Accordingly, the verb

²⁵⁰ Crubellier (1994: 539).

²⁵¹ Ivi, 'il s'agirait d'inférer la nature de ce qu'on ne voit pas (les principes du tout) à partir de ce qu'on voit (le commencement des animaux et des plantes)'.
²⁵² Arist., *De insomniis*, 461b20; *Metaph.* N4, 1092a12 (i.e., the passage under analysis); *Meteorologica* 369a30, 370a12; *PA*, 653a3; *De respiratione* 473b8; *De sensu et sensibilibus* 445a13.

²⁵³ Arist., *De partibus animalium* 653a3, or, as in the *Meteorologica* ὥς παρεικάσαι μείζονι μικρόν πάθος'.
46

παρεικάζω, at least in such parenthetical statements, seems a) to be used by Aristotle in *his own practice* in order to provide an explanation for something which is not visible, on the basis of an inductive reasoning; b) to imply a comparison between two different kinds of objects, one of which we can account for on the basis of its observability, while the same cannot be said for the second. Therefore, Aristotle can conclude that by comparing ‘small things with big ones’ we can find an account for something which is unaccountable on the basis of empirical observation. So far, things seem to be pretty clear. However, the explanation for the unobservable phenomenon is always provided *before* what we took to be the support for an analogical and inductive explanation.²⁵⁴ Aristotle *first* explains the detailed functioning of the blood vessels and how the blood reaches the brain and cools down, and *then* he offers a similar account on the basis of what happens with vapor carried by the heat to the upper regions where it condenses into water and falls back in the form of showers. In this respect, the analogy seems to be much more *illustrative* rather than *explicative*. It is not by reference to the showers that the phenomenon of the blood reaching the brain is explained, but, on the contrary, showers are used just as an illustrative example of what is taken to happen inside the brain. The same can be said for the other occurrences of the verb in the Aristotelian corpus, which can be resumed as follows:

1. One occurrence of παρεικάζω, where the verb seems to simply mean ‘to resemble’.²⁵⁵

²⁵⁴ It may be helpful, here, to compare this uses of ‘images’ with Aristotle’s criticism of ‘example’ in *Posterior Analytics*. An example (παράδειγμα) ‘stands neither as part to whole, nor as whole to part, but rather as part to part (ὡς μέρος πρὸς μέρος), when both are subordinate to the same term, and one of them is familiar. It differs from induction, because induction starting from all the particular cases proves (as we saw) that the extreme belongs to the middle, and does not connect the deduction to the extreme, whereas argument by example does make this connexion and does not draw its proof from all the particular cases’, *Apo.*, 69a14-18. As Lloyd notes (1966: 404-409), ‘in the *Rhetorics*, he (viz. Aristotle) treats the paradigm as a *persuasive*, rather than demonstrative, argument (my emphasis). [...] He also points out that if no ‘rethorical syllogisms’ are available, then we must try to prove our points with paradigms; but if we have enthymemes (i.e. rethorical syllogisms), then paradigms should be used as supporting evidence. *But then the paradigm should not be put before the enthymemes (for in that position they would reesemble an induction, and induction is usually inappropriate in rethorical speeches), but after them, in the role of evidence*’ (ivi: 406). In this respect, Lloyd’s analysis of the use of paradigm in Plato is also relevant: ‘In general, analogies are used as *an effective technique of persuasion* (my emphasis), particularly in recommending various political and ethical doctrines, although it is true that Plato sometimes allows Socrates to claim to have *demonstrated* his conclusions by this means.’ Indeed, Plato seems not to be as methodologically consistent as he himself would require. However, apart from (i) a heuristic usefulness of analogies in the process of recollection, Lloyd stresses as valuable methodological points (i) the emphasis on how likenesses are often deceptive (see, e.g. *Phaed.* 262a-c; *Soph.* 231a); (ii) how specific analogies are challenged in various early dialogues (e.g. *Charm.* 165bff; *Meno.* 72d-f); (iii) the *didactic* and *persuasive* function of likenesses (*Polit.* 278a8ff).

²⁵⁵ Arist., *De insomniis*, 461b20. I provide the context for a better understanding: ‘For whenever a man sleeps, with most of his blood going down to his heart, the motions within the blood—some of which are potential, some actual—go down together with it. And the motions are such that in any motion of the blood this motion emerges from it, and if this motion perishes, that one emerges. In fact, they relate to one another just like the artificial frogs which float up in the water as the salt dissolves—in the same way the motions are present potentially, and with their restraint removed, they actualize, and having been set free they move around in the little bit of blood remaining in the sense-organs, having a likeness as figures in the clouds which people

2. A difficult Aristotelian example asserting that that which can be smelled (ὀσφραναντός) can be reasonably (εὐλόγως) likened or compared (παρεικάσται) to ‘an immersion or washing of dryness in the moist and fluid’, whose understanding is quite unintelligible.²⁵⁶

3. Two occurrences related, respectively, to examples provided by Empedocles and Clidemus, in their accounts of physical phenomena. In the case of Empedocles, before introducing his verses explaining the functioning of the processes of inhalation and exhalation, Aristotle says that the philosopher had illustrated the process by reference to the clepsydras (παρεικάζων τὸ συμβαῖνον ταῖς κλεψύδραις). Once again, even in Empedocles’ verses, the description of the process of inhaling and exhaling is first described in all its specific facets, and then related to the example of a girl playing with a clepsydra, which seem to play the role of an illustrative metaphor. In the case of Clidemus, Aristotle’s report is much shorter and, in this respect, more difficult to assess. He witnesses that, for some people, including Clidemus, lightening was to be considered as appearing, rather than existing, and that they ‘compared’ (παρεικάζοντες) it to what happens when you strike the sea with a rod by night and the water is seen to shine’.²⁵⁷

The use of the verb elsewhere in Aristotle to criticise other philosopher’s analogies would appear to suggest a comparison provided by Speusippus himself. However, what seems common to all occurrences is that the comparisons provided function as a support for claims provided *on another basis* and not as demonstrations themselves. In other words, the parallels are provided as illustrative metaphors to visually explain and support philosophical claims which would otherwise be difficult to support by means of empirical observation. Possibly, Speusippus, either being pressed on the absence of good in his principles, or in order to support with a more intelligible example his claims, could have indeed referred to biological parallels. But this should not lead us to think that his conclusions were based on these. On the contrary, under these circumstances it seems more likely that they were used

compare (παρεικάζουσιν) now to men, then to centaurs as they quickly transform’, trans. McDavid and Ouranou, (*Summer Workshop in Ancient Philosophy, Aristotle On Dreams*, Rethymno 11-17 July), available at <http://www.fks.uoc.gr/english/cvs/karamanolis/OnDreamstransl.pdf>.

²⁵⁶ Arist., *De sensu et sensibilibus*, 445a13; I take Carbone’s translation to be the most understandable in terms of content: ‘Pertanto l’essere dotato di odore è qualcosa di comune a entrambi e appartiene al tattile, all’udibile e al diafano. Perciò *lo si accosta ragionevolmente* all’immersione o al lavaggio di qualcosa di secco in un liquido o in un fluido’ (2002: 107, my emphasis), although the example remains quite obscure to me. Moreover, the translation keeps the reference to an illustrative metaphor; for it says: ‘for this reason (διό) it is reasonably (εὐλόγως) associated to [...]’.

²⁵⁷ Transl. Webster. The context seems to be that of defying lightning. In this respect, cf. Lloyd (1966: 404): ‘we may note that he (viz. Aristotle) condemns the use of metaphor in reasoning and *particularly in giving definitions*’.

only to provide an illustration and support for his claim that qualities such as beauty and goodness are shown at a different stage of nature. For although Aristotle seems to imply that the conclusion was transposed from a biological to a metaphysical claim, in all the other polemical occurrences of the verb, what represents the first term being compared (or brought closer to a second image) is expressed with the accusative, while the illustrative and supportive metaphor with the dative. If this analysis is right, Speusippus had his own reasons to hold that beauty and goodness did not exist in the principle, and, in need of an illustrative example, he might have referred to biological examples. Given this background, if we read [FR. 57] again, the thesis ‘ἐξ ἀορίστων ἀτελῶν τε ἀεὶ τὰ τελειότερα’ should be understood as the logical reason provided for why first principles do not to have qualities such as good and beautiful and not, as Aristotle is trying to show, as a reason justified by empirical comparisons.

But let us take a closer look at Speusippus’ thesis as offered in [FR. 53] in parallel to the general principle provided in [FR. 57]. In the previous sections (2.2-2.4), we associated the following three premises with Speusippus: (i). What is most beautiful and noble does not exist in the principle; (ii). Principles are causes; (iii). Beauty and completeness are in the things arising out of the principles. We concluded our analysis by supposing that the premises expressed by Speusippus were formulated mainly with reference to first principles. The main difference between the information provided by Aristotle in [FR. 57] is that the notion of causality is, in this last passage, not emphasised.²⁵⁸ But if we supply this claim, and we observe the three premises more closely, there is space to doubt that the general claim ‘ἐξ ἀορίστων ἀτελῶν τε ἀεὶ τὰ τελειότερα’ might be a result of Aristotle’s own reading of Speusippus’ thesis. Indeed, if what is most beautiful and noble does not exist in the principle, *although the principle is a cause*, it is clear that, in Aristotle’s view, the principle is ἀτελής, incomplete, in comparison to what it causes.²⁵⁹ On the contrary, if beauty and completeness appear in the things arising out of the principle, those things will be, in comparison with the principle, τελειότερα, more complete. In fact, the general thesis ‘ἐξ ἀορίστων ἀτελῶν τε ἀεὶ τὰ τελειότερα’ expresses a comparison in terms of degree between the first and the last term. Things arising out of the principles are not said to be *complete*, but *more complete*. And if they are more complete, they must be more complete in comparison with something else: i.e. they more complete than the seed, and, therefore, than their principle. Unfortunately, as the evidence is limited, the solution to the problems just examined necessarily requires some

²⁵⁸ However, it can be reasonably considered as implicit in γεννᾷ.

²⁵⁹ See, Arist. *Metaph.* Λ3 1070a6-9; *Phys.* 2.7 198a26-27; 3.2 202a9-12 where we can find relevant discussions on the necessary homogeneity of the cause and its effect.

dose of speculation. Nevertheless, as already pointed out, the teleological terminology provides Aristotle with an easier framework to refuse Speusippus' claims, and always occurs later in the accounts, preceding the counterexample of the seed. Even in the present context, the introduction of the discussion relates to the presence or absence of good in the principles, and it is only as an afterthought that Aristotle focuses his attention on completion. Aristotle's vocabulary operates a gradual *climax* in the range of adjectives used from a) ἀορίστων ἀτελῶν τε; to b) τὰ τελειότερα; and, finally, c) τέλειαι. At first, things arising out of the principles are presented as *more complete* (τελειότερα). This comparison, as an implication, entails that principles are, at least in comparison with them, *incomplete* (ἀτελῆ). Once Aristotle has established the consequence of the comparison, the counter-example becomes relevant: for even plants and animals come out of something which is *complete* (τέλεια), and not from something which is incomplete. Accordingly, Aristotle is here supplying the same deficient premises provided in the previous fragment, but with a different phrasing. Namely, the general claim 'ἐξ ἀορίστων ἀτελῶν τε αἰ τὰ τελειότερα' establishes that, *if*, for Speusippus:

- I. The principle of plants and animals is incomplete.
- II. Plants and animals are more complete than the seed.

Then:

- III. The seed is a principle.

Once again, as Crubellier also notes, Aristotle had accommodated a temporal reading of τῇ [ἀρχῇ] τῶν ζώων καὶ φυτῶν. As highlighted in [FR. 53], Aristotle would once again agree that, in time, plants and animals are brought to completion from something which is not complete. But he cannot agree on what is ontologically prior, which is (a) man, and not the seed.²⁶⁰ Accordingly, as the same considerations drew in relation to [FR. 53] can be expanded to this fragment as well [FR. 57], the plausibility of our conclusions is confirmed.²⁶¹

²⁶⁰ Note the closeness of the formulation of the counter-example in both fragments: τὸ πρῶτον οὐ σπέρμα ἐστὶν - καὶ οὐκ ἔστι τὸ σπέρμα πρῶτον.

²⁶¹ I am aware that my analysis completely overlooked two aspects: a) the second term used by Aristotle, i.e. the adjective ἀόριστος, which might be taken as providing information on the characterisation of Speusippus' principles; b) the reference to the annihilation of the One. As the discussion of Speusippus' principles will be addressed in Chapter 5, for the moment I will limit myself only to brief considerations. Indeed, we would expect the adjective ἀόριστος to be associated to the second principle only, τὸ πλῆθος, as the term is commonly used by Aristotle to refer to the Dyad and to matter (see, for instance, Arist., *Metaph.* Z 1029b20-21: λέγω δ' ὕλην ἢ καθ' αὐτὴν μήτε τι μήτε ποσὸν μήτε ἄλλο μηδὲν λέγεται οἷς ὥριστα τὸ ὄν, 'By matter I mean that which in itself is neither a particular thing nor a quantity nor designated by any of the categories which define Being', transl. Tredennick). On the contrary, in the fragment under analysis the consequences drawn lead to the annihilation of One only. One possible way to avoid the difficulty would be to suppose that Aristotle has here in mind the two principles, and that he is conflating features suitable not only to the One, but to Plurality as well. The obvious difficulty for such a reading is that the text does not provide any hint in this direction except

2.7 Why participation?

Aristotle's criticism in [FR. 53] and [FR. 57] can be summarised as follows: (i) Speusippus wrongly conceived of his principles as of a seed; (iii) accordingly, Speusippus' principles cannot be (ontologically) prior and exercise their function of principles. Indeed, both theses Aristotle attributes to Speusippus (τὸ δὲ καλὸν καὶ τέλειον ἐν τοῖς ἐκ τούτων; ἐξ ἀορίστων ἀτελῶν τε ἀεὶ τὰ τελειότερα) focus the attention on a process of *development* or *engendering*, and on a process which brings forth *completion*. In such a process, the seed is wrongly taken to be the origin. By employing Aristotle's own theoretical framework of potency and actuality, we could say that the *dynamis* principles embodied in Speusippus' system is, from Aristotle's perspective, a deficient one, specifically for it is a *dynamis*; because although Aristotle makes clear that actuality is prior, and not potency, the relationship between the principles and their offspring is connoted in terms of indefiniteness, incompleteness or absence of qualities'.²⁶²

So much for what concerns the textual analysis of the passages. However, I believe there are elements which may allow us to push the conclusions a bit further.

Premise (i), as reported by Aristotle, appears to imply the ontological posteriority of what is qualified over what is unqualified. In other words, the thesis entails that what is ontologically prior, cannot yet be qualified in terms of properties. Indeed, qualities such as beauty and goodness are posterior ontologically, with respect to what is unqualified. As we have shown, parallel versions of the thesis suggest that it had a specific *designatum*, primary principles; moreover, qualities that are often taken into account are beauty and goodness, possibly related to emblematic Platonic examples. If this analysis is plausible, we may read the thesis, in its ontological nuance, as a response to the Platonic theory of the Forms and as an attempt to fix it. Indeed, if premise (i) requires the ontological priority of what is unqualified over what is qualified, Forms cannot be taken to meet this requirement. In fact, qualities such as beauty, nobility and goodness are exemplified absolutely in the Forms. But if Forms cannot meet the requirement of being unqualified, they cannot be postulated as ontologically prior. On the contrary, principles, analytically conceived, do meet the

for the plural: ἐπὶ τῶν πρώτων. In general, I take ἀόριστος to play a role in Speusippus' conception of both principles, and to be related to the difficulty Aristotle seems to usually have concerning the ontological status of Speusippus' first principles.

²⁶² One may note, however, that Aristotle also denies that the seed is actually a human being in potency. (see Arist. *Metaph.* Θ8, 1049a14–18). It would be interesting to compare the criticism Aristotle raises in [FR. 53] and [FR. 57] and that addressed in *Metaph.*, N5. 1092a 21–1092a 24; 1092a 29– 1092b5 (where the seed analogy appears once again) with Aristotle's own embryological theories (in particular *GA* I, 18.724b6–11). As such an investigation would lead me astray from the present purpose, I postponed the discussion to a different context.

requirements of premise (i), i.e., being unqualified. Thanks to Aristotle we know that Speusippus, having seen the ‘δυσχέρειαν καὶ πλάσιν’ of Platonic Forms, rejected ideal number and posited mathematical number alone.²⁶³ And it is Aristotle again who suggests that, for Speusippus, the *δυσχέρεια* also derived from ‘granting goodness [τὸ εὔ] as belonging (ὡς ὑπάρχον) to the ἀρχή’.²⁶⁴ If principles, in Speusippus’ system, were to embody the paradigmatic role²⁶⁵ Forms played in Plato’s doctrine, they would be liable to the same criticism. For, as Aristotle points out elsewhere, if the One, insofar as principle of numbers, were to be good, its offspring would also result to be good.²⁶⁶ The results would then be an overabundance of goods. However, Aristotle never addresses such charges to Speusippus.²⁶⁷ Hence, his principles are constructed according to different hypotheses.

By generalising Speusippus’ reasons to reject that the One is (the) good, it seems possible to relate such a rejection with (a) Speusippus’ refusal of Plato’s theory of Forms and (b) the difficulties that these intrinsically held in their relation to sensible objects.²⁶⁸ Platonic participation, indeed, obtained a precarious balance between the fact that Forms needed to be close enough to sensibles in order to share their properties and characteristics and, at the same time, distant enough not to be confused with them; to some extent, they needed to be separated and independent from them.²⁶⁹ This ontological account, as Aristotle emphasises many times, and as Plato possibly realised himself,²⁷⁰ brought inherent contradictions especially with reference to the sensibles, which shared different properties and characteristics of Forms (as dialectic shows at a logical-epistemological level) with these latter remaining unique. Accordingly, in Speusippus’ system principles would be conceived as causes, as premise (ii) suggests, but they would lose their ontological grounding in their consequents, being characterised as completely unqualified. ²⁷¹ Indeed, I believe that although the phrasing of premise (i) more explicitly addresses some qualities that Forms exemplified, the problem it calls attention to has a broader significance: the sharing of

²⁶³ Arist., *Metaph.* M9, 1086a2-5.

²⁶⁴ Transl. Menn (unpublished, Iy3: 40).

²⁶⁵ Or only causal activity which Aristotle attributes to the Forms.

²⁶⁶ See Arist. *Metaph.* N4, 1091b27-28.

²⁶⁷ Instead, Aristotle appears to present this result as a reason for Speusippus to deny that the One is good. See Arist., *Metaph.* N4, 1091b21ff.

²⁶⁸ As previously highlighted, also the word *δυσχέρεια* points at logical difficulties.

²⁶⁹ See, among others, Fronterotta (2001), the essays collected in Fronterotta (2010) and Fronterotta and Leszl (2011).

²⁷⁰ As, for instance, in the *Parmenides*, in the *Theaetetus*, or in the *Sophist* where the greatest kinds (μέγιστα γένη) are introduced.

²⁷¹ Another possible solution would be to consider principles of each level as minimally qualified (e.g. those of numbers as qualified only quantitatively; those of magnitudes dimensionally (or, possibly, numerically and dimensionally), etc.). On these reading, primary principles would still be the least qualified, or completely unqualified.

qualities between Forms and sensible in general, or, in other words, participation. Hence, if what Speusippus considered to be problematic of the Platonic view is precisely the sharing of qualities among Forms and sensibles, it is appropriate to consider Speusippus' principles as *totally* unqualified and not just in relation to those qualities here taken into account.²⁷²

Broadening the scope of Speusippus' conception of principles by considering participation as a problem he was actually targeting would be consistent with:

a) Fragments related to Speusippus' inquiry into the sensibles, which bear no reference to qualities the objects enquired (which are all sensible objects, mainly plants and animals) share but only provide a sketch of their relation in terms of similarities and differences.²⁷³ Sensible objects are indeed compared by means of reciprocal similarities and differences, and vertical relationships are difficult to identify.

b) The absence of criticism related to regress implied in the Third Man argument. Indeed, if anything else in Speusippus' system was expected to take on paradigmatic activities²⁷⁴ in place of the Forms, Speusippus' system would suffer from the same problem of Plato's. But this does not emerge from Aristotelian critiques, which never address the argument of the Third Man explicitly to Speusippus.

c) The continuous reference to qualities, participation²⁷⁵ and predication which emerges out of Aristotle's considerations following [FR. 58]. In the following portions of text, the reference to qualities, and to qualities shared by different kinds of beings, are issues which are central. Indeed, the reference to beauty and good is often formulated,

²⁷² Indeed, the numerical characterisation of first principles (One and Plurality) does not explicitly contradict my thesis.

²⁷³ See, e.g. fr. 38-47 IP1.

²⁷⁴ I am not sure what Isnardi Parente's position on this point is. Although she seems to argue in favour of an analogical relation between different kinds of principles, she sometimes seems to hint at a paradigmatic activity performed by numbers, e.g. when she calls them 'models'. See, for example (1980: 278), where numbers are said to be: 'modelli transcendenti (viz. del reale)'; (1977: 1024), where Speusippus is defined 'il teorizzatore precipuo del numero, il sostituto dei modelli numerici ai modelli eidetici'; (2005: 6): 'Aristotele non ci dice mai chiaramente che Speusippo ritenesse che i numeri debbano svolgere la funzione che hanno, nel sistema di Platone, le idee. E' però integrazione necessaria, dal momento che egli ci dice che i numeri sono il primo e fondamentale tipo di essere, e che sono separati dai sensibili, il che significa che ne costituiscono il tratto trascendente di unificazione'.

²⁷⁵ Participation becomes a more explicit target once we turn to the difficulties Aristotle lists at 1091b22-1092a5 (from line 1091b22 to 1092a5 the verb μετέχω occurs four times) and addressed to those who make the Good a principle (see also Crubellier 1994: 522 and 533-534). On several occasions, when listing the difficulties Aristotle differentiates Speusippus' position and claims he wanted to avoid them. One mention is particularly significant, as it is connected to Speusippus' refusal to connote primary principles as contraries. For, by making primary principles opposites, and connoting them as Good and Evil, respectively: 'συμβαίνει δὴ πάντα τὰ ὄντα μετέχειν τοῦ κακοῦ ἕξω ἐνὸς αὐτοῦ τοῦ ἐνός' (and the same remark is repeated in Λ10, 1075a34-36).

also when addressed more generally to those Platonists who kept the identity between the good and the principle(s), as a relation of predication of specific attributes.²⁷⁶ As Crubellier notes, Aristotle highlights quite insistently, as he does in [FR. 58], that Speusippus' postulation of the existence of mathematical number alone, arose precisely 'd'une prise de conscience des conséquences intenable de l'identification entre l'Un et le Bien'.²⁷⁷ And these consequences, in the way they are spelled out in the critiques addressed to the Platonists, point precisely to relationships of predication and participation.

Moreover, I believe that such a response would provide explanatory advantages both in accounting for aspects of Speusippus' system that have been neglected by scholars, and in view of a coherent reconstruction of Speusippus' doctrines.

a) If Speusippus' postulation of unqualified principles is prompted in response to the charge of metaphysical separation, and thus releases the sensibles from an ontological/epistemological dependence and grounding in the Forms, this would perfectly match with the weight conceded by Speusippus in his surviving testimonia to inquiry into the sensibles.²⁷⁸ This aspect is usually neglected or incidental in scholarly accounts, which focus more on reconstructing supposedly metaphysical theories preserved in later sources, rather than give Speusippus' focus on scientific research the right credit. Besides the biological fragments preserved by Athenaeus, Diogenes Laertius²⁷⁹ bears witness of not one, but *ten* volumes of a book of (*Dialogues*) *On the Science of Similars*, of a book entitled *Divisions and Hypotheses on the Similars* and of a book on *Examples of Genuses and Species*. Although Speusippus is also credited with the view that it is impossible to define anything without knowing all other objects

²⁷⁶ See, for example (Arist. *Metaph.* N4 1091b 16ff.) the discussion on the attributes of self-sufficiency and eternity. These, for Aristotle, belong to the first principle and are good because the principle itself is good substantially (note here that the discussion is not addressed to Speusippus, who, supposedly, would encounter the same difficulty if he had conceived of his principles as self-sufficient and eternal. Once again, we can therefore suppose that these 'qualities' were not claimed by Speusippus as features of his principles); or, also, the discussion on units becoming specimen of good themselves, if they participate in the One, which is good (Arist. *Metaph.* N4, 1091b25-26). In this case, the relationship between the One and the units is expressed by the formula 'B is ὅπερ A' or 'ὅπερ A τι', which, as Crubellier (1994: 529) notes, means that A is a genus to which B belongs, when this attribution is made on the ground of its essence (once more, Aristotle says here that Speusippus, in order to avoid this difficulty, abstained from positing ideal number and posited mathematical number alone. From this, it seems clear that at least some of the problems were indeed related to the relation of participation). The same for the discussion of evil, to which everything in the world would participate in with the exception of the One, if the two principles are conceived of as opposed contraries (Arist. *Metaph.* N4 1091b35ff).

²⁷⁷ See, e.g. 1091a36-b3; b32-35 Crubellier (1994: 519).

²⁷⁸ This will be analysed in more detail in Chapter 4.

²⁷⁹ Diog. Laert., IV, 1, 4-5.

differing from that first (indeed, one needs to know the object which he is defining, plus all of those that differ from the object in question), this does not imply that he considered knowledge of such sensible realities as totally impossible.²⁸⁰ If, as Aristotle testifies, the axioms of mathematics cannot be applied to the sensibles, maybe we should take this claim as confirming that these latter deserve a *different kind of inquiry* that results in a *different kind of knowledge*.²⁸¹

b) Secondly, this reading also accommodates the difficulties experienced by Speusippus in relation to the diairetic method, and recognised by some scholars as *the* difficulty that led him to refuse the Platonic theory of Forms.²⁸² Indeed, for both Cherniss and Isnardi Parente,²⁸³ Speusippus' problem was related to a short-circuit in Plato's system, noticeable when one wants to understand the diairetic partitioning method within an ontological perspective.²⁸⁴ As I believe that, for Speusippus, it was precisely the relation of Forms and sensibles that was considered problematic, an intervention in the system constituted of unbinding the sensibles both from mathematical number and from the principles, also avoid the problems related to an ontological grasping of the qualities they bear.

c) Lastly, if this reading is correct, it would expose Speusippus' primary concern: to solve a problem in Plato's doctrine by allowing the possibility of ensuring different epistemological practices, addressed to different kinds of objects. By characterising first principles as unqualified, Speusippus is trying to ensure the possibility of different kinds of enquiries related to different objects and to preserve the internal structure *at each level of being*. Moreover, this interpretation would be consistent with Speusippus' conception of mathematical number, the first of *beings*²⁸⁵ (πρῶτον τῶν ὄντων) and a reality by itself (καθ' αὐτὴν φύσιν).²⁸⁶ According to these premises, mathematical number would drop its role of being intermediate: it does not

²⁸⁰ And so argues Horky (2018: 36-37), who claims Speusippus 'is not to be credited [...] with any sort of proto-sceptical argument that a regress implies that no essence can be known whatsoever'. By contrast, he suggests the argument may be used in order to show 'that prenatal knowledge of all the essences is required for knowledge of any single essence, which can only, in fact, be obtained via discursive dialectic'.

²⁸¹ As Sextus' testimony seems to confirm (=fr. 34 IP1) when distinguishing between 'ὁ ἐπιστημονικός λόγος', the criterion for noetic objects, and 'ἡ ἐπιστημονικὴ αἴσθησις', the criterion for sensible objects. On Sextus report, see Isnardi Parente (1969) and (1992), Cambiano (2011), Kaklamanou (2012) and Dillon (2018).

²⁸² My reading obviously cannot accommodate the position of Dillon (2003), who interprets Speusippus' system as a generative reality originating in the One.

²⁸³ Isnardi Parente (1980: 58-59), Cherniss (1962: 38ff).

²⁸⁴ I leave aside the question of whether it is legitimate or not to actually consider the diairetic method as exposing interrelated ontological reality in such way.

²⁸⁵ Arist., *Metaph.* M6 1080b14-16.

²⁸⁶ Arist., *Metaph.* N2 1090a4.

work as a paradigmatic cause and, in virtue of its independence from sensible objects, it guarantees, owing to its eternity, immutability and unchangeability,²⁸⁷ a different and secure kind of knowledge. This manoeuvre secures at the same time the possibility and independence of mathematical and geometrical practices²⁸⁸ and the stability of their conclusions. Indeed, as the independence of both levels is symmetrical, objects may differ in their ontological consistency and stability, but precisely because of their difference, they also allow enquiries that are differentiated and suitable *to each of them*.

While an episodic structure of the world results from this picture, at the same time the reasons for its episodocity become clearer. If Aristotle accuses Speusippus of having condemned the world to a badly constructed tragedy, he does not recognise the advantage of Speusippus' commitment: self-sustainability at each level of being implies independence not only of their objects, but also of the different kinds of knowledge for their pursuit. ²⁸⁹

²⁸⁷ On the status of the objects of theoretical sciences as not allowing any kind of γένεσις, see Procl., *In Eucl.* 77,7ff Friedlein (=fr. 36 IP₁). This aspect will be dealt with in section 3.4.

²⁸⁸ The claim that mathematical and geometrical practices are rendered impossible is indeed addressed against Xenocrates. See, e.g., Arist. *Metaph.*, M8, 1083a 31-b 8 (=fr. 29 IP).

²⁸⁹ On Speusippus' and Xenocrates' theory and practice of philosophical education, see Horky (2018). In a very recent paper, Dillon (2018) also argues that Early Academic philosophers accounted for a form of knowledge (different from and inferior to that of the intelligible world) also at the level of sensibles. His account relies mainly on Sextus' report (=fr. 34 IP₁). For a different reconstruction of Speusippus' account of sensible knowledge, see Kaklamanou (2012).

CHAPTER THREE: MATHEMATICAL NUMBER

As we have seen in the last chapter, Speusippus' refusal of Plato's theory of Forms seems to be connected to the complications this held in relation to the sharing of qualities between sensible particulars and the Forms themselves, insofar as these were functioning as their ontological and epistemological grounding. Speusippus' solution to these complications relied on a separation between ontological levels, which granted to each level independence both in terms of ontological subsistence and epistemological autonomy. It is on this ground that the philosopher holds 'that mathematical number alone exists, the first of beings and separate from sensible things'.²⁹⁰ As argued there, Aristotle's testimonies are not consistent terminologically when speaking of the mathematical realm, as they refer to numbers, mathematical objects and, sometimes, even mathematical propositions. What seems to be consistent across Aristotle's reports, though, is the insistence that numbers are the first *ὄντα*, the first *beings*, and the claim that Speusippus refused to postulate ideal numbers as, for instance, Xenocrates did. Moreover, the reference to numbers as the first *ὄντα* also squares with some later testimonies, Proclus' in particular, in which the objects of theoretical sciences are described as eternal, immutable and ingenerated. Given this background, the aim of the present chapter is to analyse the role mathematical number plays in Speusippus' system, through a comparison of Aristotelian *testimonia* and a passage preserved by Proclus and related to the same topic. To this purpose, section 3.1 will offer an overview of Aristotle's texts, in order to gather consistent information about mathematical objects in Speusippus' thought. Sections 3.2 and 3.3 will concentrate on the relationship mathematical number is said to entertain with primary principles (the One in particular), and especially on Aristotle's attempts to explain the generation of number(s) out of them. Lastly, section 3.4 will concentrate on a passage preserved in Proclus' *Commentary on the First Book of Euclid's Elements* that attests to a dispute within the Academy on the right appellation for mathematical propositions. Indeed, as Aristotle's information is sketchy and incomplete, the comparison with Proclus' evidence will be crucial for testing the results and acquiring a synoptic view of the subject.

²⁹⁰ Arist., *Metaph.* N6, 1080b 15-16.

3.1 The mathematical realm in Aristotle's testimony (frr. 73; 74; 75; 76; 77)

Accordingly, let us turn to what Aristotle has to say *specifically* about Speusippus' mathematical theories which, unfortunately, is not much. Hence, our strategy will consist in providing a broad view of the main texts, in the attempt to reconstruct a coherent view concerning the mathematical realm.

[FR. 73] Now there are three kinds of substance. One is sensible [...]. Another is immutable, which certain thinkers hold to exist separately; some dividing it into two classes, others combining the Forms and the objects mathematics into a single class, and *others (recognizing) only the objects of mathematics as of this nature* (οἱ δὲ τὰ μαθηματικά μόνον τούτων).²⁹¹

[FR. 74] There are two views on this subject. Some say that mathematical objects, i.e. numbers and lines, etc., are substances; and others again that the Forms are substances. Now since some recognize these as two classes—the Ideas and the mathematical numbers—and others regard both as having one nature, and yet others *hold that only the mathematical (substances) are substances* (ἕτεροι δὲ τινες τὰς μαθηματικὰς μόνον οὐσίας εἶναι φασί), we must first consider the mathematical objects, without imputing to them any other characteristic [...].²⁹²

[FR. 75] Some hold that both kinds of number exist, that which involves priority and posteriority being identical with the Forms, and mathematical number being distinct from Forms and sensible things, and both kinds being separable from sensible things; *others hold that mathematical number alone exists, being the primary reality and separate from sensible things* (οἱ δὲ τὸν μαθηματικὸν μόνον ἀριθμὸν εἶναι τὸν πρῶτον τῶν ὄντων κεχωρισμένον τῶν αἰσθητῶν). [...] Some distinguish mathematical objects from those which “come after the Ideas”; and of those who treat the subject in a different manner *some speak of the mathematical objects and in a mathematical way*—viz. *those who do not regard the Forms as numbers, nor indeed hold that the Forms exist*—and others speak of the mathematical objects, but not in a mathematical way (τῶν δ' ἄλλως λεγόντων οἱ μὲν τὰ μαθηματικά καὶ μαθηματικῶς λέγουσιν, ὅσοι μὴ ποιοῦσι τὰς ιδέας ἀριθμοὺς μηδὲ εἶναι φασιν ιδέας, οἱ δὲ τὰ μαθηματικά, οὐ μαθηματικῶς δέ).²⁹³

[FR. 76] Nor again is the theory sound which certain other thinkers hold concerning numbers. These are those who do not believe in Forms, neither absolutely nor as being certain numbers, but *believe that the objects of mathematics exist, and that the numbers are the first of existing things, and that their principle is the One itself* (εἰς δ' οὗτοι ὅσοι ιδέας μὲν οὐκ οἶονται εἶναι οὔτε ἀπλῶς οὔτε ὥς ἀριθμοὺς τινὰς οὔσας, τὰ δὲ μαθηματικά εἶναι καὶ τοὺς ἀριθμοὺς πρῶτους τῶν ὄντων, καὶ ἀρχὴν αὐτῶν εἶναι αὐτὸ τὸ ἓν).²⁹⁴

[FR. 77] Those who posit the objects of mathematics only besides sensible things, because they saw the difficulty and artificiality regarding the Forms, abandoned Ideal number and posited mathematical number (οἱ μὲν γὰρ τὰ μαθηματικά μόνον ποιοῦντες παρὰ τὰ αἰσθητά, ὁρῶντες τὴν περὶ τὰ εἶδη δυσχέρειαν καὶ πλάσιν, ἀπέστησαν ἀπὸ τοῦ εἰδητικοῦ ἀριθμοῦ καὶ τὸν μαθηματικὸν ἐποίησαν).²⁹⁵

²⁹¹ Arist. *Metaph.* Z 1069a33ff, transl. Tredennick. In all passages, the italics is mine.

²⁹² Arist. *Metaph.* M 1076a18-24, transl. Tredennick modified.

²⁹³ Arist. *Metaph.* M 1080b1-6; 24-30, transl. Tredennick.

²⁹⁴ Arist. *Metaph.* M 1083a22-26, transl. Tredennick.

²⁹⁵ Arist. *Metaph.* M 10836a3-6 transl. Tredennick.

As mentioned previously, Aristotle's terminology is not consistent and fluctuates between: τὰ μαθηματικά, τὰς μαθηματικὰς οὐσίας, τὸν μαθηματικὸν ἀριθμὸν, τοὺς ἀριθμούς. In this respect, as the phrasing of Speusippus' theory is also dependent on the context it is presented in by Aristotle, it is hard to infer what its original formulation might have been, and whether it was related to mathematical number only, or whether it could be extended to comprise the mathematical realm more broadly. Nevertheless, we may observe that such fluctuation between 'number(s)' and 'mathematical objects' more broadly might hint at some sort of unitarian conception of the mathematical realm as such, of which number is to be considered the first component. Indeed, Aristotle is relatively consistent in referring to mathematical number *specifically* as the first of beings, rather than to mathematical objects more generally. If this is right, it would confirm the provisional obtained in Chapter 1:²⁹⁶ Speusippus had a unitarian conception of the mathematical realm, which comprised mathematical number(s) as well as geometricals.

A unitarian conception of the mathematical realm is also suggested by the repeated mention of *alone*, or *only* next to 'mathematical number(s)' or 'mathematical objects'. In some passages, this specification is clearly meant to distinguish Speusippus' position from those of Plato and Xenocrates, who, according to Aristotle, had postulated the existence of either both Forms *and* mathematical number, or had merged the two into a single nature. In this respect, the 'only' serves as a clarification that Speusippus did something different, and, by refusing the existence of ideal number and Forms he posited mathematical number *only*. However, the specification occurs also in another context, where Speusippus is referred to as: 'οἱ μὲν γὰρ τὰ μαθηματικὰ μόνον ποιοῦντες παρὰ τὰ αἰσθητά'. The formulation 'παρὰ τὰ αἰσθητά' is precisely that of Z2, where Aristotle was referring to those people who believed that there were several kinds of οὐσίαι beyond sensible bodies. In that circumstance, Aristotle had listed, besides number(s), magnitudes and soul. In this context Aristotle seems to imply that, besides sensible bodies, Speusippus had postulated the existence of mathematical objects *only*. Leaving aside the question of soul (about which information provided by Aristotle is so poor that it does not allow any consideration of the topic), it seems plausible to conclude that numbers and magnitudes (at least) are referred to together here as τὰ μαθηματικά. Indeed, also the formulation: 'τὰ δὲ μαθηματικὰ εἶναι καὶ τοὺς ἀριθμούς πρῶτους τῶν ὄντων' suggests as much: Speusippus believes that mathematical objects exist, and that numbers are the first of beings. Indeed, the sentence seems to convey a

²⁹⁶ See, *infra*, section 1.2.

comprehensive conception of mathematical objects, of which numbers constitute a part. In this respect, as Aristotle's terminology is not consistent, but numbers usually are the subject of his criticism when he complains about Plato and the Academics (as a group), we might reasonably suppose that Aristotle sometimes refers to mathematical number in order to exemplify features that, in Speusippus' mind, might have belonged to the mathematical realm as such. In this respect, the idea of a unitarian conception of the mathematical realm (as opposed to the sensible realm) starts to acquire some consistency. And this supposition seems to be even more reasonable when we observe that the counterpart for mathematical number (or mathematical objects), is usually the sensibles. Aristotle says that mathematical number is separated *from the sensibles* and that Speusippus conceived mathematical number as some sort of 'καθ' αὐτὴν φύσις',²⁹⁷ an entity by itself, and he justifies its separateness by stating that: 'those who treat number as separable assume that it exists and is separable because *the axioms will not apply to sensible objects*'.²⁹⁸

Moreover, as already underlined in Chapter 2, these passages confirm that the reason for postulating mathematical objects *only*, and therefore for refusing too the existence of ideal number, is related to the rejection of the Forms. Although they do not take on paradigmatic or causal functions, mathematical objects preserve two important features Plato granted to the Forms: separability and self-subsistence. Mathematical number is *separated* from the sensibles, and is an entity in itself. The insistence on characterizing mathematical number as separated and in denying any causal effect onto the sensibles seems to be justified, once again, by appeal to epistemological reasons. For Aristotle testifies that the separateness of mathematical number is motivated by the fact that the axioms of mathematics are not true of sensible bodies. Just as we observed in the previous chapters, granting ontological independence to the mathematical realm consequently grants its gnoseological independence as well. The separation of mathematical number seems to fulfil specifically this aim: allowing for different epistemological practices at different ontological levels. In this respect, the postulation of mathematical number would account for the preservation of mathematical and geometrical practices and, possibly, for the truth of their objects. By

²⁹⁷ Arist., *Metaph.* N2, 1090a1-13, οὐθενὸς γὰρ οὔτε φησὶν ὁ λέγων αὐτὸν εἶναι, ἀλλ' ὥς αὐτὴν τινα λέγει καθ' αὐτὴν φύσιν οὔσαν, οὔτε φαίνεται ὢν αἴτιος, 'He who maintains its existence does not claim that it is the cause of anything, but regards it as an independent entity; nor can we observe it to be the cause of anything', transl. Tredennick.

²⁹⁸ Arist., *Metaph.* N3, 1090a35-1090b1, οἱ δὲ χωριστὸν ποιοῦντες, ὅτι ἐπὶ τῶν αἰσθητῶν οὐκ ἔσται τὰ ἀξιόματα, ἀληθὴ δὲ τὰ λεγόμενα καὶ σαίνει τὴν ψυχὴν, εἶναι τε ὑπολαμβάνουσι καὶ χωριστὰ εἶναι, 'But those who treat number as separate assume that it exists and is separate because the axioms will not apply to sensible objects; whereas the statements of mathematics are true and appeal to the soul', transl. Tredennick. Note here, that the passage addresses numbers only, but takes its counterpart to be sensible objects only, and not sensibles and magnitudes combined.

addressing a stable and independent kind of object, mathematical and geometrical discussions proliferating inside and outside the Academy could rely on a secure kind of knowledge. Moreover, the rejection of ideal number serves a second purpose: it allows independent inquiry into the sensibles. By denying the existence of ideal number, Speusippus exempts numbers from fulfilling causal requirements as well as sensibles from ontological and causal dependence on them. Not only are mathematical axioms not true of sensible objects; sensible objects do not need them: their study will indeed require a different kind of understanding.

To wrap up our observations briefly, what seems to be consistent in Aristotle's *testimonia*, and can therefore be taken as fairly reliable can be summarised as follows:

- a) Speusippus postulated the existence of mathematical number and refused the existence of both ideal number and the Forms. Aristotle is not consistent in speaking about Speusippus' mathematical theories, and his wording oscillates between 'numbers' and 'mathematical objects'. Nevertheless, this oscillation suggests a unitarian conception of the mathematical realm as such.
- b) Aristotle constantly specifies that Speusippus' postulated mathematical objects (or number(s)) *only*. The specification can to be explained both in view of a differentiation of Speusippus' position from those of Plato and Xenocrates, and as another indication that the mathematical level can be conceived of as unitary.
- c) Mathematical number is separated from the sensibles and is the first of beings ($\pi\rho\tilde{\omega}\tau\omicron\nu\ \tau\tilde{\omega}\nu\ \acute{\omicron}\nu\tau\tilde{\omega}\nu$). In Aristotelian accounts, sensibles often represent the counterpart of the mathematical realm.
- d) The principle and element of mathematical number is the One.

Besides the aspects just listed, the specific features of the theory remain very obscure. Moreover, the synthesis of all of these aspects does not really say much about the details of Speusippus' mathematical theories, nor about how numbers are to be connected to the principles, and how we should understand the construction $\acute{\epsilon}\kappa$ + genitive in passages connecting principles with their consequents. It is especially in regard to the latter point that Aristotle preserves other crucial information. Accordingly, the next section will try to understand how mathematical number is related to the principles and how Speusippus conceived of this relationship.

3.2 The generation of numbers: Aristotelian candidates (fr. 83)

As observed, Aristotle does not provide us with detail concerning the role of the mathematical realm in Speusippus' philosophy. Moreover, what remains completely obscure is the crucial transition from first principles to numbers. In this regard, even if we are not provided with any detail, Aristotle does at least refer to the generation of numbers in two occasions. The first occurs in *Metaph.* M:

[FR. 83] Ἐτι πῶς μὲν ἐνδέχεται εἶναι ἐκ τοῦ ἐνὸς καὶ πλήθους τὸν ἀριθμὸν οὐθὲν ἐπιχειρεῖται· ὅπως δ' οὖν λέγουσι ταῦτά συμβαίνει δυσχερῇ ἅπερ καὶ τοῖς ἐκ τοῦ ἐνὸς καὶ ἐκ τῆς δυάδος τῆς ἀορίστου. ὁ μὲν γὰρ ἐκ τοῦ κατηγορουμένου καθόλου γεννᾷ τὸν ἀριθμὸν καὶ οὐ τινὸς πλήθους, ὁ δ' ἐκ τινος πλήθους, τοῦ πρώτου δέ (τὴν γὰρ δυάδα πρῶτόν τι εἶναι πλήθος), ὥστε διαφέρει οὐθὲν ὡς εἰπεῖν, ἀλλ' αἱ ἀπορίαι αἱ αὐταὶ ἀκολουθήσουσι, μῖξις ἢ θέσις ἢ κρᾶσις ἢ γένεσις καὶ ὅσα ἄλλα τοιαῦτα.

Further, no attempt is made to explain how it is possible for number to originate out of the One and Plurality; but howsoever they account for this, the same difficulties follow for those who (originate)²⁹⁹ number out of the One and the indeterminate Dyad. For one generates number from that which is universally predicated and not from a particular plurality; the other from a particular plurality, viz. the first; for they hold that the Dyad is the first particular (τι) plurality. Thus, there is practically no difference between the two views; the same difficulties will be involved with regard to mixture, position, blending, generation and the other similar modes of combination.³⁰⁰

In the first line of the testimony, Aristotle experiences the same frustration modern scholars do when they try to understand how the generation of numbers works in Speusippus' account. For Aristotle affirms Speusippus made *no attempt at all* (οὐθὲν ἐπιχειρεῖται) to explain how it is possible for number to arise³⁰¹ out of the One and Plurality, the two primary principles postulated by Speusippus. Although we could still question Aristotle's honesty, (and suppose that Speusippus actually had an account for such a generation, or production) the fact that Aristotle equates Speusippus' principles with those of Xenocrates in order to reject any option for the generation of numbers seems to indicate that Speusippus neither provided any specific explanation for the generation of number(s) out of primary principles, nor yet did he consider it as a crucial transition in need of justification.³⁰²

²⁹⁹ As in Crubellier (1994: 347), I supply εἶναι ἐκ + gen from the previous sentence.

³⁰⁰ Arist., *Metaph.* M9 1085b5–12, 21–27, transl. Tredennick modified.

³⁰¹ Although I am using different terminology, the relation of number with first principles is usually expressed with ἐκ + the genitive (see, e.g. fr. 53 and 57 in Chapter 2, sections 2.1 and 2.6), and no verb of production is provided.

³⁰² I agree with Annas (1976 :186) that Speusippus probably didn't say 'anything definite on this topic'; because if otherwise, 'Aristotle would hardly produce a priori arguments to show that it must be impossible'. However, I disagree as to how she understands the argument: 'The argument plays on the difficulty in seeing how plurality contribute anything towards the formation of a unit, since a unit is precisely what cannot be pluralized; so, it seems that plurality cannot be a factor in the production of units'. As it will be clear in the next pages, I believe Aristotle's argument to raise a difficulty related specifically to the impossibility for pluralities of units to actually result in unified compounds. In this respect, both the One and Plurality are seen as problematic principles.

Aristotle's strategy has three steps. First (i), he highlights the problem: Speusippus did not explain how number can originate out of the One and Plurality (εἶναι ἐκ τοῦ ἑνὸς καὶ πλῆθους τὸν ἀριθμόν). Secondly (ii) he conflates Speusippus and Xenocrates by equating their second principles; as both philosophers generate numbers out of the One and a second principle of plurality, Aristotle concludes there is practically no difference between the two accounts. However, this second step is crucial, for both Speusippus' universally predicated πλῆθος and Xenocrates' δυνάς are in fact equated to a *particular plurality* (τι πλῆθος). Lastly, (iii) on the basis of the equation of the two principles of plurality with the 'particular pluralities', he raises difficulties to both accounts by exploiting the elision of the former formulations in favour of the latter. Let us analyse the testimony more carefully.

- a. First of all, what is immediately odd in Aristotle's strategy, is that although the focus of Aristotle's criticism is number (i.e. he asks how it is possible *for number* to originate out of the principles), no attention is drawn to the fact that Speusippus and Xenocrates had very different accounts of number. The distinction is not trivial at all: Speusippus' mathematical number is constituted by units that are combinable, whereas the units of Xenocrates' ideal numbers are not combinable nor comparable to one another (ἀσύμβλητοι³⁰³). Aristotle is well aware of the difference. For Xenocrates is usually criticised with respect to this aspect of his doctrine specifically, which, according to Aristotle, renders mathematical practices impossible.³⁰⁴
- b. The lack of distinction between the different kinds of number postulated by Xenocrates and Speusippus is, I believe, strictly related to step (ii) of Aristotle's strategy. For the equation is meant to establish that number arises out of the One and a second principle of plurality. More specifically, the equation makes number the product of the combination of the One with a *particular plurality*. And Aristotle's 'equivocation' here is crucial to his dialectic: all the options for the production of numbers, in fact, amount to modes of combination, and, more specifically, to atomistic modes of combination.
- c. This strategy is, however, at least weirdly intricate: Aristotle presented Speusippus' primary principles (or, at least the One) as elements. If the connotation of 'element' is

³⁰³ On the theory of the 'ἀσύμβλητοι ἀριθμοί' as already held by Plato see Wilson (1904). Such a debated theory arises out of a statement of Aristotle (*Metaph.* N8 1083a32). Ross (1924b: 427) suggests that συμβληταί in the context of books N means to be 'capable of entering into arithmetical relations with one another of being added and subtracted, multiplied and divided'.

³⁰⁴ See, for instance, Arist., *Metaph.* M6 1080a15–b4. The composition of Xenocrates' number will be dealt with more specifically in Section II of the thesis. See, *infra* Chapter 7.

to be intended in the Aristotelian way, namely, as basic structural constituent, it is at least bizarre that Aristotle does not mention it in this context. For, if principles are to be conceived as elemental constituents, Aristotle could easily show that, once numbers are produced, they do not fulfil adequate forms of compounds. However, this seems precisely where Aristotle wants to go. Indeed, the equation of Speusippus' Plurality with Xenocrates' Dyad intended as the first particular plurality (i.e. number two) amounts to an equation of 'Plurality' with 'number two', and, namely, with two units.

- d. Although the modes of production listed by Aristotle point to combinability, perhaps a different focus for the discussion is required. In the end, the distinction between mathematical and ideal number seems not to represent a compelling difference in this context, at least to the extent that Aristotle does not mention it at all. If this is the case, we should probably think of the way in which mathematical and ideal numbers can be considered as akin. Namely, that both can be conceived as *unitarian*, or *homogeneous compounds of units*. In this respect, the equation of a 'universally predicated plurality' with a 'particular plurality' might serve a different purpose in Aristotle's strategy. In other words, Aristotle might be pointing out that the One, although considered as principle of numbers, does not accomplish the result of rendering unitarian the compounds originating out of it: plurality, especially when determined, is irreducible to unity.³⁰⁵

Almost all the processes listed by Aristotle involve precisely some sort of combination out of elements. Mixture ($\mu\tilde{\iota}\xi\iota\varsigma$), listed as the first process, receives a long treatment in the context of chapter 1.10 of the *De generatione et corruptione*, where it is distinguished from aggregation, and, in general, from all other sorts of combination which do not result in homogeneous products.³⁰⁶ Indeed, in order to accomplish $\mu\tilde{\iota}\xi\iota\varsigma$ the elements involved in the combination should be opposed but balanced, share the same matter and be able to act and be acted upon reciprocally, thus implying a homogeneous result.³⁰⁷ In the context of the *De*

³⁰⁵ Note that if my interpretation is right, Aristotle is here playing with two different conception of 'element'. On the one hand, element as a basic constituent of number (i.e. units). And this seems the way plurality is conceived of in the passage. On the other hand, the One is an element insofar as it is immanent to the things deriving out of it, and, in this respect, its results should accomplish an organic form of unity.

³⁰⁶ See, D. Frede (2004: 294); Giardina (2008: 57-61).

³⁰⁷ Giardina (2008: 61-62). Giardina (2008: 63) summarises the conditions for $\mu\tilde{\iota}\xi\iota\varsigma$ to be present as follows: 'In conclusione: 1) la mescolanza esiste e non è solo apparenza come sostenevano Empedocle, gli Atomisti e Platone; essa è combinazione di elementi che si alterano e che quindi sono diversi in atto ma uguali in potenza a ciò che erano prima della mescolanza; 2) la mescolanza avviene quando gli elementi che si mescolano hanno una materia comune, condizione del loro reciproco agire e patire; 3) la mescolanza riguarda soprattutto i corpi facilmente divisibili, in primo luogo i liquidi non vischiosi'.

gen. et corr., Aristotle's targets can be identified as the atomists and Empedocles,³⁰⁸ who, according to Aristotle, had confused mixture with aggregation. Indeed, in atomic compounds, the compositional elements, even when aggregated, remain unvaried, and only deceive our sense-perception. For sense-perception, unable to distinguish the elements involved in the aggregation because of their smallness, perceives them as a unitarian compound. The same consideration seems to be extensible to the units, which do not seem to undergo any sort of real mixture in numerical compounds, but only to compose an aggregated whole. If this is the case, Aristotle's argumentative strategy grounds its justification in the assimilation of atoms and units.³⁰⁹ Strictly speaking, numbers are not *generated*, for generation would involve some change in the original elements implicated in the process, which do not happen in an aggregated compound.

The second option listed is position (θέσις). Once again, the term reflects the technical language used by Aristotle to describe the differential factors in Democritus' atomic theory.³¹⁰ According to Aristotle's testimony, Leucippus and Democritus explained the differentiation of the objects populating our world by appealing to atoms' differences in shape, order and position.³¹¹ The example given by Aristotle explains the differences quite clearly: A and N differ in shape; AN and NA differ in order; Z differs from H in their positional orientation. If we can take this latter as an example to understand what Aristotle means by θέσις, once again it seems understandable why this model cannot work for Xenocrates' and Speusippus' units to explain the generation of different numbers. We might guess that since units are identical, their composition cannot differ according to their position.³¹² The third term used by Aristotle is κρᾶσις, blending. The term recurs often in Aristotle's corpus³¹³ but, among the occurrences, it appears in a very interesting passage of *De gen. et corr.*³¹⁴ In this passage, Aristotle's targets are the atomists. Aristotle explains that:

so long as the constituents are preserved in small particles (κατὰ μικρά), we must not speak of them as combined. For this will be a composition instead of a blending or

³⁰⁸ Isnardi Parente notes that the reference to μῖξις seems to be addressed to Eudoxus of Cnidus as well, and to go beyond a critique addressed to Speusippus only (IP2: 39). However, she believes Aristotle is here accusing Speusippus of not having distinguished adequately an absolute and a determinate plurality.

³⁰⁹ This hypothesis may be substantiated by the fact that the corresponding terminology belongs to Aristotle's criticism, and not to the atomists' language. The differences identified by Aristotle as: σχῆμα, τάξις, θέσις should in fact correspond to Democritus': ῥυσμός, διαθιγή and τροπή. On this aspect, see Von Fritz (1938: 26).

³¹⁰ See Arist. *Metaph.* A4 985b15-17 and H2, 1042b14.

³¹¹ Arist. *Metaph.* A4 985b16-22.

³¹² However, in Xenocrates' perspective units are not qualitatively identical. Or this is at least what Aristotle seems to imply by commenting that not any two units make number 2 (Arist., *Metaph.* M6 1080b28-30).

³¹³ Some of the occurrences are very interesting for our context as well. As an example, the term is used with reference to the harmonic theory of the soul: Arist., *De an.*, 407-408.

³¹⁴ Arist., *De gen. et corr.*, 328a7-11. See also Annas' commentary (1976: 259-260, passages quoted and comment on mixture and juxtaposition).

combination (σύνθεσις γὰρ ἔσται καὶ οὐ κρᾶσις οὐδὲ μίξις); nor will the part exhibit the same ratio between its constituents as the whole. But we maintain that, if combination has taken place, the compound must be uniform—any part of such a compound being the same as the whole, just as any part of water is water.³¹⁵

In this case, it is the comparison of units with atoms that grounds Aristotle's rationale. Moreover, here we find the two terms κρᾶσις and μίξις together. If we take atoms (or units) to be Aristotle's target when he mentions τὰ μικρά, it is clear that, for Aristotle, there cannot be any kind of uniform compound out of them. Blending or combination cannot occur, since atoms and units can combine, but cannot uniformly *mix* together. For, insofar as the One is considered as one of their principles, numbers should fulfil *uniform* compounds: an outcome they do not accomplish. In the end, just as much as Speusippus did not want to describe his principle as good because if otherwise, this would result in a multiplication of goods, so too the same comment can be extended to the characterisation of the principle as One. Why, then, although they result out of the One, do units not accomplish unity? As a consequence, μίξις, θέσις and κρᾶσις cannot provide a coherent explanation for the generation of numbers. Surely, they cannot explain the generation of ideal numbers, because the units composing each number cannot be subtracted or added to others.³¹⁶ But what is odd is that Aristotle does not use this explanation to reject the generation of *mathematical number*. On the contrary, in [FR. 83] Aristotle couples Speusippus' account with that of Xenocrates, in order to reject it. As previously highlighted, Speusippus' and Xenocrates' conceptions of primary principles are furthermore criticised by Aristotle with respect to their characterisation as *elements* of numbers. Also, we have seen that the options for generation listed by Aristotle in the passage often find revealing parallels in Aristotle's criticism of the atomic theory. Accordingly, if we consider an element to be the minimum constituent of a compound, all of these critiques would follow quite straightforwardly. Why, then, Aristotle does not choose

³¹⁵ Id., trans. Joachim.

³¹⁶ At Arist., *Metaph.* N5, 1092a24-29, Aristotle wonders what is the way in which numbers are derived, and the options listed in the previous text occur once again: 'Is it by mixture? But (a) not everything admits of mixture; (b) the result of mixture is something different; and unity will not be separable, nor will it be a distinct entity, as they intend it to be. Is it by composition, as we hold of the syllable? But (a) this necessarily implies position; (b) in thinking of unity and plurality we shall think of them separately. This, then, is what number will be—a unit plus plurality, or unity plus the Unequal', transl. Tredennick. The passage, whose context will be dealt with in the following section, clearly evokes the same discussion of M9 here under analysis. However, the focus of the discussion is shifted from the necessity of unity within compounds to the characterisation of the principles as elements. For a unitarian interpretation of books M and N of the *Metaphysics*, consisting in Aristotle's rejection of the Platonists' 'generalising' and 'elementarising' methods, see Cattanei (1989, 1990a and 1990b). Cattanei argues that Aristotle's arguments in books M and N amount to a rejection of the Platonists' (i) 'metodo generalizzante' (according to which Platonists acknowledged, in general 'di porre ciò che è più universale come ontologicamente anteriore rispetto a ciò che è meno universale', 1990a: 192-193) and (ii) 'metodo elementarizzante' (i.e. that determining 'la sostanzialità intellegibile degli elementi costitutivi di un composto, sia esso empirico o sostanza intellegibile non semplicissima, e la trascendenza dell'elemento più semplice rispetto a quello meno semplice' 1990a: 184). The rejection of such methods allows to identify Aristotle's *pars construens* of the analysis (Cattanei 1990b), consisting in his theory of abstraction.

this path? The reason most likely lies in the different conception that Speusippus has of an *element*, and in the way his principle of plurality is described in [FR 83]. For, all the different options for combination here listed by Aristotle, as well as the comparison with atomic units, seem to point at one and same direction: the lack of unity in the compounds. How can numbers, *qua* unitarian compounds of units, arise out the principles?

3.3 The generation of numbers: γένεσις

In the previous section, I deliberately avoided the reference to one of the terms listed by Aristotle: γένεσις. My reasons for this avoidance are many; first, the term γένεσις does not appear in specific theoretical frameworks like the others, which all occur in parallel polemical contexts connected to atomistic theories. In this respect, the term requires a separate analysis. Secondly, the topic has been indirectly touched upon in the Aristotelian critique against Speusippus' first principles. As the analysis of Chapter 2 concluded, Speusippus' first principles are, in Aristotle's eyes, deprived, insofar as their consequents show qualities that they do not hold. In this perspective, the critique indirectly addressed a wrong conception of γένεσις as well: indeed, how can principles, with their absence of qualification, be causes of such qualified consequents? Some of these questions occur again in another passage of N5, which is neither included by Isnardi Parente nor by Tarán as a genuine Speusippean fragment.³¹⁷ As a matter of fact, the passage deals more generally with the Platonists' conception of elements and does not address Speusippus specifically. However, as the passage retains references to many of the questions raised so far, I believe that a few observations are necessary and can be helpful in clarifying the issues under discussion.

Ἔδει δὲ τοὺς λέγοντας ἐκ στοιχείων εἶναι τὰ ὄντα καὶ τῶν ὄντων τὰ πρῶτα τοὺς ἀριθμούς, διελομένους πῶς ἄλλο ἐξ ἄλλου ἐστίν, οὕτω λέγειν τίνα τρόπον ὁ ἀριθμὸς ἐστίν ἐκ τῶν ἀρχῶν. [...] Καὶ ἐπεὶ τὸ ἐκ τινῶν εἶναι ἔστι μὲν ὡς ἐνυπαρχόντων ἔστι δὲ ὡς οὐ, ποτέρως ὁ ἀριθμὸς; οὕτως γὰρ ὡς ἐνυπαρχόντων οὐκ ἔστιν ἄλλ' ἢ ὧν γένεσις ἔστιν. ἄλλ' ὡς ἀπὸ σπέρματος; ἄλλ' οὐχ οἷόν τε τοῦ ἀδιαίρετου τι ἀπελθεῖν. ἄλλ' ὡς ἐκ τοῦ ἐναντίου μὴ ὑπομένοντος; ἄλλ' ὅσα οὕτως ἔστι, καὶ ἐξ ἄλλου τινός ἐστιν ὑπομένοντος. ἐπεὶ τοίνυν τὸ ἐν ὁ μὲν τῷ πλήθει ὡς ἐναντίον τίθησιν, ὁ δὲ τῷ ἀνίσῳ, ὡς ἴσῳ τῷ ἐνὶ χρώμενος, ὡς ἐξ ἐναντίων εἴη ἂν ὁ ἀριθμὸς· ἔστιν ἄρα τι ἕτερον ἐξ οὗ ὑπομένοντος καὶ θατέρου ἐστὶν ἢ γέγονεν. Ἔτι τί δή ποτε τὰ μὲν ἄλλ' ὅσα ἐξ ἐναντίων ἢ οἷς ἔστιν ἐναντία φθείρεται, κἂν ἐκ παντὸς ἦ, ὁ δὲ ἀριθμὸς οὐ; περὶ τούτου γὰρ οὐθὲν λέγεται.

Those who assert that beings [arise] out of elements, and that the primary realities of things are numbers, ought to have first distinguished the senses in which one thing is derived from another, and then explained in what way number is derived from the first principles. [...]. And since being [derived] from certain things is, as it were, [being derived] from things that are inherent or not, in which way is number so derived?

³¹⁷ My analysis of the passage is strongly indebted to Crubellier's commentary (1994: 544-559), to which I refer for a more detailed analysis of the passage.

Derivation from inherent elements is only possible for things which admit of generation. Is it derived as from seed? But nothing can be emitted from that which is indivisible. Is it derived from a contrary which does not persist? But all things which derive their being in this way derive it also from something else which does persist. Since, therefore, one thinker regards the One as contrary to plurality, and another (treating it as the Equal) as contrary to the Unequal, number would have to be derived as from contraries. Hence there is something else which persists from which, together with one contrary, number is or has been derived. Further, why on earth is it that whereas all other things which are derived from contraries or have contraries perish, even if they are [derived] out of the whole [contrary], number does not perish? Of this no explanation is given.³¹⁸

Aristotle points out, from the very first line, a difficulty presenting the core of his critiques. In saying that beings (τὰ ὄντα) and numbers (as the first of them) arise from the elements (ἐκ στοιχείων) Speusippus is not clear about: πῶς ἄλλο ἐξ ἄλλου ἐστίν. The absence of a clear verb to connote the generation, constructed only by the verb εἶναι and ἐκ plus the genitive, is constant in Aristotle's account of Speusippus. Indeed, either Speusippus himself accounted for the origination of number in such an undetermined way,³¹⁹ or, following Aristotle's usual criticism, he did not provide an account for it at all. In order to shed some light on the issue, Aristotle offers his own options for thinking about generation. What seems different than the previous discussion, however, is that if in [FR. 83] Aristotle's challenge was related to the unity and homogeneity that numerical compounds cannot accomplish, here the attention is shifted onto the relation principles entertain with their consequents. In particular, what is at stake here is how principles can combine in order to produce something other than themselves. For, in this section, Aristotle's aim is to show that it is impossible to conceive the principles as elements.³²⁰ We can adapt Crubellier's insight here: 'the element is defined in book Δ as ἐξ οὗ σύγκειται πρῶτου ἐνυπάρχοντος (i.e. 'the primary immanent thing of which something is composed', transl. Tredennick) — starting from this definition (which applies to the simplest models of generation, i.e. mixture and composition), the critique of N5 encompasses more complex or rare forms of synthesis, in which the cause ἐξ οὗ is not preserved in the final product, namely, the transmission of the peculiar form by means of the seed, and the action of a contrary which is destroyed in the process'.³²¹ Without wishing to address all the details of the debate, which relates to the Academics' as a group,³²² there are a few aspects I would like to highlight and which will be useful in view of the whole discussion.

³¹⁸ Arist., *Metaph.*, N5. 1092a 21-1092a 24; 1092a 29- 1092b5, transl. Tredennick.

³¹⁹ An option that I am inclined to accept, although Aristotle's criticism is obviously not limited to pointing out the obscurity of a linguistic expression.

³²⁰ Or, as Crubellier (1994: 553) phrases it: 'étant admis que les principes sont des éléments, quel type de dérivation peut-on envisager pour les autres êtres, à commencer par les nombres?'.

³²¹ Crubellier (1994: 545), my translation.

³²² See, for example, that the two principles are considered by Aristotle as opposite, as it does not seem to be the case for Speusippus. For a detailed analysis of the whole section, see Crubellier (1994: 544-558).

Aristotle's previous criticism addressed atomistic conceptions of compounds with the purpose of showing that, ultimately, such conceptions of atomic compounds could never be taken as models, since they do not accomplish unity in numbers; in the present context, it seems that it is the eternity of number particularly at stake. For all the options for numerical generation listed by Aristotle reflect ways in which *sensible things* are generated, and, accordingly, cannot be applied to objects that are eternal and immutable.³²³ But this provides us with some important information: numbers do not perish and do not undergo generation. Accordingly, if we take the mathematical realm to be somehow opposed or distinguished from that of the sensibles, we might have discovered one reason to distinguish the two realms by appeal to ontological features of their diverse objects: numbers (or mathematical objects) are eternal and unchangeable, while sensibles aren't. Forasmuch as this consideration might seem intuitive, this tells us that Speusippus embraced at least some of the features postulated by Plato for real objects of knowledge, i.e. eternity and immutability, by characterising numbers (or the mathematical realm) as eternal and immutable. Also, this explains the reason for Aristotle to disagree with Speusippus' (and the Platonists' more in general) position, according to which in order to grant numbers with immutability and unchangeability, numbers must be considered to arise out of the principles rather than, as in M2 and N1, being conceived as 'quasi-objects' constructed out of collections of empirical objects.³²⁴

Secondly, if the notion that numbers arise out of the principles is established in order to guarantee their eternity and unchangeability, this might well be the explanation for other levels to be granted with different principles, and for them to be ultimately independent of the same set of principles. For, although the information about other ontological levels is not well preserved, such an explanation would account for ontological differences between different objects. In this regard, sensible objects, being freed from their causal dependence on numbers, would finally be discharged from the need to share features with other ontological levels, and, accordingly, could acquire epistemological independence as well.

Lastly, the overall criticism, as highlighted by Crubellier, is directed against those kinds of generative processes in which principles are not preserved in the products. Although it is easy to understand the immediate difficulty in imagining a material part "detaching" from something indivisible, I believe that what is significant here is, more in general, the reference to forms of processes whose elements, or principles, are *not preserved* in their results. In the end, number specifically is described as eternal, and unchangeable, aspects which are reaffirmed at the end of the passage. Given these premises, despite Aristotle's attempt to offer precise meanings for the derivation of number out of the principles, it would probably be more

³²³ As also Szlezák observes (1987: 49-51).

³²⁴ Crubellier (1994: 544).

natural to assume that this generation should not be accounted for *in principle*. For, if otherwise, the status of number itself as eternal and unchangeable would be denied. Accordingly, what the passage should help bring to mind is *not* the generation of numbers as such, but the need of a different way to conceive the relationship between principles and products, which does not account for their generation, but, rather, for something else.

3.4 A brief digression: Speusippus' and Menaechmus on the right appellative for mathematical propositions (fr. 36)

In order to conclude our analysis of Speusippus' conception of the mathematical realm, it is necessary to digress briefly from our treatment of Aristotle and turn to a relevant discussion preserved in Proclus' *Commentary on the First Book of Euclid's Elements*. As already highlighted, Aristotelian passages do not preserve much information about the mathematical level, nor about how this is related to first principles, which solicits scholarly speculation. More information, however, can be found in Proclus. Proclus, indeed, is the only source who testifies to a dispute internal to the Academy that finds Speusippus and Menaechmus contending on the right appellative for mathematical propositions. The controversy, which is not simply a terminological discussion, reveals important details of Speusippus' ontological and epistemological conception of the principles. Given my methodological premises, and due to some complications which will be highlighted in the following analysis, my use of Proclus' testimony will be limited to a test of the results just obtained, rather than being employed as a source for new data.³²⁵

The dispute between Menaechmus and Speusippus is introduced by Proclus to present two different processes, according to which consequents can be deduced from principles. Even though the context of the excerpt is predominantly mathematical, featuring an exhibition of Euclid's notions of the common principles of geometry, an attempt to unravel philosophical and metaphysical elements is nevertheless worth undertaking. After all, even Aristotle had described Speusippus as speaking of mathematical objects in a mathematical way (οἱ μὲν τὰ μαθηματικὰ καὶ μαθηματικῶς λέγουσιν).³²⁶ According to Euclid, Proclus

³²⁵ For a detailed and accurate analysis of the passage, and of the conception of geometry according to Plato and his successors see Bénatouil-El Murr (2010: 57-80). Through an analysis of the passages preserved by Proclus, they conclude that far from making geometry a model for rigor and accuracy, Speusippus and Xenocrates considered it: 'un paradigme des contraintes propres à la connaissance humaine - du fait de sa distance à ses objets éternels - et des stratégies (hypothèses, figurations, constructions) qu'elle peut mettre en œuvre afin de les saisir, à condition de ne pas oublier les limites de leur objectivité' (2010: 77). I will treat their interpretation in greater detail in the next chapter, where the second passage of Proclus will be part of my analysis. In general, I believe our readings to be compatible, although they differ on some interpretative issues. Differently, Lasserre (1964, ad loc.) takes the discussion to exemplify the paradigmatic roles of a philosopher (Speusippus), a mathematician (Menaechmus) and a logician (Anphinomous).

³²⁶ Arist., *Metaph.*, M6 1080b1-6; 24-30 (=fr. 75 IP).

claims, the common principles of geometry can be divided into hypotheses (ὑποθέσεις), postulates (αἰτήματα) and axioms (ἀξιώματα). The difference between the three kinds of principles, then, is explained according to Aristotle's definitions. An axiom is a proposition that is evident and credible in itself, as, for example, 'that things equal to the same thing, are equal to each other'.³²⁷ A hypothesis is, instead, something that, although it is not self-evident, is presumably accepted by the learner, e.g. 'the circle is a figure of such-and-such a sort'. Lastly, something that is asserted but not known and that does not receive the assent of the learner, is called a postulate, as, for example, the assertion that 'all the right angles are equal'.³²⁸ It is clear from this framework that Proclus wants to ground his discussion in a mathematical context. Indeed, the principles here taken into account are those of geometry, and the procedures analysed seem to involve, in the broader sense, mathematical deduction. The discussion then moves from the principles (αἱ ἀρχαί) to the things '(deriving) from the principles'³²⁹ (τὰ ἀπὸ τῶν ἀρχῶν). It is at this level that things are divided into problems and theorems, and this is where the testimony on Speusippus finds its place.

[FR. 36] ἤδη δὲ τῶν παλαιῶν οἱ μὲν πάντα θεωρήματα καλεῖν ἡξίωσαν, ὥς οἱ περὶ Σπεύσιππον καὶ Ἀμφίνομον, ἡγούμενοι ταῖς θεωρητικαῖς ἐπιστήμαις οἰκειότεραν εἶναι τὴν τῶν θεωρημάτων προσηγορίαν ἢ τὴν τῶν προβλημάτων, ἄλλως τε καὶ περὶ αἰδίων ποιούμεναι τοὺς λόγους. οὐ γὰρ ἐστὶ γενέσεις ἐν τοῖς αἰδίοις, ὥστε οὐδὲ τὸ πρόβλημα χώραν ἐπὶ τούτων ἂν ἔχοι, γενέσειν ἐπαγγελλόμενον καὶ ποιῆσιν τοῦ μήπω πρότερον ὄντος [...]. ἄμεινον οὖν φασι λέγειν, ὅτι πάντα ταῦτα ἐστὶ, τὰς δὲ γενέσεις αὐτῶν οὐ ποιητικῶς ἀλλὰ γνωστικῶς ὁρῶμεν ὥσανεὶ γινόμενα λαμβάνοντες τὰ αἰεὶ ὄντα [...]. οἱ δὲ ἀνάπαλιν πάντα προβλήματα λέγειν ἐδικαίουν ὥς οἱ περὶ Μέναιχμον μαθηματικοὶ [...].

Already among the ancients, some, such as the followers of Speusippus and Amphinomus, thought it right to call all of them [sc. things that follow from the principles]³³⁰ 'theorems' (θεωρήματα); they thought that the appellation 'theorem' is more proper for theoretical sciences than the appellative 'problems', especially since these sciences deal with eternal objects. For there is no generation in eternal objects, so that there would not be any place for the 'problem' among them, since this indicates generation and production of what did not yet exist before. [...] Thus, it is better, according to them, to say that all these things exist and that we look on their generation not in a productive sense (ποιητικῶς), but in a cognitive sense (γνωστικῶς), assuming eternal things (λαμβάνοντες τὰ αἰεὶ ὄντα) as if they were in the process of coming to be (ὥσανεὶ γινόμενα) [...]. Others, on the contrary, such as the mathematicians of the school of Menaechmus, thought it correct to say that all things are 'problems' (προβλήματα).³³¹

The extract touches upon issues that are crucial for our inquiry but raises many questions

³²⁷ Procl., *In Eucl.*, p. 76, 11-12 Friedlein, transl. Morrow.

³²⁸ Ibid., p. 76, 15 Friedlein, transl. Morrow.

³²⁹ Ibid., p. 76, 20-21 Friedlein, transl. Morrow.

³³⁰ The reference for πάντα is supplied by Proclus in the sentence preceding the passage under examination (77, 7 Friedlein)

³³¹ Ibid., p. 77, 7ff Friedlein, transl. Kidd (257-258) complemented.

as well. First of all, a brief contextualization: the passage is to be found in the second prologue of Proclus' *Commentary on the First Book of Euclid's Elements* where Proclus, in order to provide an appropriate presentation of the topic, distinguishes the principles of the science (τὰς ἀρχὰς τῆς ἐπιστήμης viz. geometry) from things that follow from the principles (τὰ ἀπὸ τῶν ἀρχῶν). Then, after having presented the former as hypotheses, postulates and axioms, and the latter as theorems and problems, Proclus introduces the debate between Speusippus and Menaechmus. Although Proclus passage is embedded in a geometrical context, however, nothing guarantees that Speusippus' background for such a discussion was of mathematical nature exclusively. Actually, if we isolate the passage from its context, it is not clear what Speusippus' context was; on the contrary, the first information about the topic discussed is provided by a generic neuter plural, πάντα, referred to an initial τὰ ἀπὸ τῶν ἀρχῶν (i.e. things (deriving) from the principles) that Proclus had distinguished into problems and theorems. Next, it is said that the appellative *theorem* is the most fitting for theoretical sciences. Although the assumption may be questioned, the reference to theoretical sciences is the main evidence for connecting Speusippus' and Menaechmus' dispute to the mathematical realm, by assuming that mathematical and geometrical objects are the objects of theoretical sciences. In this respect, if geometrical objects (at least) are also to be considered the objects of theoretical sciences, this allows once more for the possibility of a unitarian conception of the mathematical realm in general. Indeed, as geometrical objects are, in the present context, presented as ungenerated and immutable (just as Aristotle had said number(s) to be), this means that they would be granted the same ontological status of numbers. In any case, Speusippus believed that the appellative *theorem* was the most appropriate for the objects of theoretical sciences. The reason provided by Speusippus for the appropriateness of the appellative, namely, that objects of theoretical sciences are eternal and unchangeable, may be used to confirm that it is the mathematical realm which is here at stake. Indeed, this takes us back to Aristotle's description of numbers (or mathematical objects in general, as I supposed), as eternal.³³² In this respect, the testimony is consistent in attesting that Speusippus maintained that (real) objects of knowledge are eternal and adds as a second feature: they are also immutable. Precisely because of this, as the name *problem* denotes a constructive and productive process, it obviously cannot be applied to eternal and immutable objects, without implying a contradiction of their status. Accordingly, we are given two possible appellatives for procedures of a mathematical kind: *theorems* and *problems*. The distinction between the two nouns seems to be played essentially by the presence or absence of an action of productive nature. While the name *problem* implies a

³³² See, *infra*, section 3.3, Ἐτι τί δὴ ποτε τὰ μὲν ἄλλ' ὅσα ἐξ ἐναντίων ἢ οἷς ἔστιν ἐναντία φθίρεται, καὶ ἐκ παντὸς ἧ, ὁ δὲ ἀριθμὸς οὐ;

generation of something new or, at least, a modification, the name *theorem* does not. Therefore, for Speusippus, the pertinence of the two appellatives is played out in the appropriateness to the *processes/absence of process* they describe.

To return to the passage, Proclus goes on explaining Speusippus' argument, and adds, with reference to the eternal objects of theoretical sciences, that the generations we observe are only apparent. We observe things that in reality always *are* but see them *as if* they were in the process of coming-to-be (ὥσανεὶ γιγνόμενα).³³³ In this circumstance, Proclus shifts from the singular, γένεσις, used to state the general condition of the absence of generation in eternal, to the plural, γενέσεις, which suggests that the topic has changed: from the eternal condition of the objects of theoretical sciences we are now considering their (apparent) productive processes. By apparent, I mean that those objects, being eternal and unchangeable, are not obviously undergoing a productive process. Indeed, in the following sentence Proclus shifts once again the attention from the derivative process itself to the human comprehension of it. Even if our human condition entails that we look at the process *as if* the consequences are actually generated and produced (and, possibly, our human practices do involve processes in apprehension of such objects), in reality the process never happens *within* mathematical and geometrical themselves, discovered and seen through our human practices. Once again, in fact, the contrast expressed by Proclus and explicated by the two different adverbs, ποιητικῶς and γνωστικῶς, exhibits a distinction between a constructive and productive process and an intellectual and deductive vision³³⁴ or comprehension.³³⁵

Accordingly, Proclus' passage confirms some of the information gathered through the analysis of Aristotle's passages. In particular:

- a) The plausibility of a unitarian conception of the mathematical realm, according to Speusippus. Indeed, mathematical as well as geometrical objects are described as ungenerated and this time, also unchangeable, thus confirming Aristotle's account of their

³³³ This whole discussion about geometry, and, in particular, about the human process of 'discovering' and 'understanding' mathematical objects that, in reality, always are, is relevant for another passage of Aristotle (*De Caelo*, I, 10, 279 b32-280a 2). In the passage, Speusippus and Xenocrates (for the identification, see Simplicius, *In De caelo*, 303, 32-33 and an anonymous scholion = Tarán fr. 61B) are said to appeal to the construction of geometrical figures in the attempt to explain the generation of the world in the *Timaeus*. For a convincing discussion of the passage, as well as cosmological discussions within the Academy, see Bénatouil (2017).

³³⁴ Taking up the reference to the verb ὁράω.

³³⁵ Echoing the reference to the roots shared with the verb γινώσκω. On this aspect specifically, see Bénatouil-El Murr (2010: 58), who link the two aspects to a distinction between the discourses made πράξεως ἕνεκα (Plato, *Resp.* VII 527 a7) and those γνώσεως ἕνεκα (527 b1) in the *Republic*.

ontological status.³³⁶

and

b) Implicitly, the incongruity of thinking of mathematical and geometrical objects as ‘generated’. Indeed, the insistence on the need of an accurate terminology to describe the objects of mathematics which does not share reference with the processes of generation and change, confirms that we must think of the relationship between first principles and numbers in a way that does not imply these processes and grants the mathematical realm with its eminent ontological status.

³³⁶ I am here considering the eternity of mathematical objects as also implying the absence of their generation. Although this may not be taken for granted, I take this outcome to be the result of the analysis undertaken in section 3.3 related to the relationship between primary principles and numbers. Accordingly, although Aristotle explicitly states *only* that numbers (and, as I supposed, mathematical objects in general) do not perish, according to the analysis we can also establish the fact that they are not generated as well.

CHAPTER FOUR: THE SENSIBLES

The only evidence Aristotle preserves with respect to Speusippus' treatment of the sensibles is summarised in the following lines:

[FR. 80] τοῖς δὲ τὸν μαθηματικὸν μόνον λέγουσιν εἶναι ἀριθμὸν οὐθὲν τοιοῦτον ἐνδέχεται λέγειν κατὰ τὰς ὑποθέσεις, ἀλλ' ὅτι οὐκ ἔσονται αὐτῶν αἱ ἐπιστῆμαι ἐλέγετο. ἡμεῖς δὲ φαμεν εἶναι, καθάπερ εἵπομεν πρότερον. καὶ δῆλον ὅτι οὐ κεχώριται τὰ μαθηματικά. [...] οἱ δὲ χωριστὸν ποιοῦντες, ὅτι ἐπὶ τῶν αἰσθητῶν οὐκ ἔσται τὰ αξιώματα, ἀληθῆ δὲ τὰ λεγόμενα καὶ σαίνει³³⁷ τὴν ψυχὴν, εἶναι τε ὑπολαμβάνουσι καὶ χωριστὰ εἶναι· ὁμοίως δὲ καὶ τὰ μεγέθη τὰ μαθηματικά.

As for those who hold that mathematical number alone exists, they cannot allege anything of this kind consistently with their hypotheses; what they did say was that the sciences could not have sensible things as their objects. But we maintain that they can; as we have said before. And clearly the objects of mathematics do not exist in separation [...]. But those who treat number as separable assume that it exists and is separable because the axioms will not apply to sensible objects; whereas the statements of mathematics are true and appeal to the soul. The same applies to mathematical extended magnitudes.³³⁸

In the preceding portion of text, Aristotle presented the reasons adduced by on the one hand Plato and Xenocrates,³³⁹ and, on the other hand, by the Pythagoreans, for justifying the existence of number. According to Aristotle, the justification of 'those who posit the existence of Forms and identify them with numbers'³⁴⁰ is based on the existence of Forms, and, in particular, on the process of abstraction from concrete examples.³⁴¹ In general, Aristotle acknowledges that those who posit the Forms, insofar as they grant Forms with causal functions to be exerted onto the sensibles, provide a similar justification for the existence of numbers, also explained via a reference to causality. Differently, the Pythagoreans justify the existence of numbers by means of similarities between attributes of numbers and sensible bodies, consequently concluding that real things are made of numbers. Given this background, Speusippus is, according to Aristotle, left with no reasons to justify the existence and separation of number from sensible things consistently. As Crubellier

³³⁷ As to the use and meaning of the verb σαίνω, see *infra* pp. 99-100, and footnote 431.

³³⁸ Arist. *Metaph.* N3, 1090a25-29; 1090a35-1090b2 (= fr. 80 IP), transl. Tredennick.

³³⁹ With Tarán (1981: 329), *contra* Ross (1924: 478), who refers the lines to Plato only (although Tarán takes the whole passage as a confutation of Speusippus), and Annas (1976: 208), who says that a 'serious identification of Forms and numbers cannot be in mind here'.

³⁴⁰ Arist. *Metaph.* N3, 109017-18, Οἱ μὲν οὖν τιθέμενοι τὰς ιδέας εἶναι καὶ ἀριθμοὺς αὐτὰς εἶναι.

³⁴¹ The preceding lines of the text are particularly difficult to read. Both Ross (1924: 480-481) and Crubellier (1994:477-478) discuss various options for understanding the passage. For our purposes, it is not necessary to determine the precise meaning of Plato's procedure, which appears to be a version of the ἐν ἐπὶ πολλῶν argument (or Platonic ἔκθεσις) but just to understand the different *a priori* rationale that it provides compared to that of Speusippus.

highlights,³⁴² it is interesting to note that Speusippus' position is here singled out from those of Plato and Xenocrates, despite the existence and separation of number is a claim to which the three of them are committed.³⁴³ The distinction is important for it provides us with crucial elements:

a) As Platonists appear to be grouped together in lines 1090a35-36 with the formula 'οἱ δὲ χωριστὸν ποιοῦντες', line 28 provides us with the peculiar justification advanced by Speusippus (namely ὅτι οὐκ ἔσονται αὐτῶν αἱ ἐπιστῆμαι ἐλέγετο), or, at least, the only he could appeal to.

b) The distinction allows us to identify two different rationales for maintaining the existence of number. Both explanations are advocated for epistemological reasons. However, that provided by Plato and Xenocrates rests on a *a priori* basis, while Speusippus' appears to be more empirically justified.³⁴⁴ Indeed, just as Forms are provided, according to Aristotle, in order to explain sensible appearances, a similar causal function is assigned to numbers.³⁴⁵ But as Aristotle underscores, Speusippus cannot rely on the causal function of Forms/numbers (and thus he cannot allege anything of this kind consistently with his hypotheses) in order to maintain that mathematical number exists. Thus, the existence of numbers is guaranteed on the following basis: if numbers were not to exist, neither would mathematical sciences;³⁴⁶ for the exactness, necessity and universality of mathematical sciences is incompatible with sensible objects.³⁴⁷

Granted these considerations, the following two crucial considerations about Speusippus' system are thus confirmed: (i) mathematical number *does not take on any causal function* in Speusippus' system; and (ii) the separation of mathematical number from the sensibles is justified by means of strong epistemological reasons; namely, the acknowledgement that

³⁴² Crubellier (1994: 482).

³⁴³ And in fact, in lines 1090a 35ff Aristotle appears to group the three of them together.

³⁴⁴ See Crubellier (1994: 482): 'Il est possible aussi que, pour Aristote, l'argument de l'accord avec l'expérience ait plus de valeur que celui de la vérité *a priori*, de sorte qu'il serait enclin à présenter celui-ci comme un pis-aller'.

³⁴⁵ Although Aristotle does not consider this step to be granted. Cf. Crubellier (1994: 480): '*a fortiori* ils ne permettent pas d'établir l'existence des nombres, puisque cela supposerait une étape supplémentaire (la détermination des idées comme des nombres) qui est loin d'être acquise'.

³⁴⁶ See the translation of the passage by Crubellier, who understands the future ἔσονται as a *reductio ad absurdum* ('mais on dit que <si ces nombres n'existaient pas>, les sciences qui portent sur eux n'existeraient pas') and takes the shift from the present (ἐνδέχεται) to the impersonal and passive imperfect (ἐλέγετο) to indicate an older and more general argument to which Speusippus resorts.

³⁴⁷ With Ross (1924: 481) 'the objects of the sciences could not be sensible things [...] and must therefore be immaterial but substantial numbers'. For the reference of αὐτῶν, see Ross (*ibid.*) 'αὐτῶν l. 27 refers to τὰ αἰσθητὰ σώματα l. 22, ἁρμονία, οὐρανός, and πολλὰ ἄλλα ll. 24, 25'.

sensible bodies and mathematical objects pertain to different domains and, accordingly, are to be granted with different and –given (i)– *independent* practices for their investigation.

Claim (ii) appears to be confirmed also by the end of the passage, where Aristotle groups the Platonists together and reiterates a similar consideration about the distinction between sensible bodies and mathematical objects more generally (including geometrical magnitudes). The reasons for positing the separation of mathematical number (besides its existence) is in fact provided by the claim that there are no axioms which apply to sensible objects (ὅτι ἐπὶ τῶν αἰσθητῶν οὐκ ἔσται τὰ ἀξιώματα)³⁴⁸, since axioms are true and please the soul. The implication, then, is that the ontological difference between sensible and mathematical objects requires them to be separated, and to be investigated by different practices. It is the ontological difference existing between sensible bodies from mathematical objects that, in turn, motivates a difference of the epistemological practices required for their examination. But as the justification for establishing the *existence* of numbers provided by Speusippus and that offered by Plato and Xenocrates differed, the consequence is that, for Speusippus, the *existence* and *separation* of numbers are *both* justified by their different ontological characteristics, and, consequently, require different epistemological practices numbers and sensible for their investigation.

4.1 The inquiry into the sensibles: the collection of the ὅμοια (frr. 84; 123-146)

As highlighted in the previous sections, the sensibles play a role within Speusippus' system at least to the extent that they are inclusively considered by Aristotle in his list of Speusippus' οὐσίαι, and insofar as they are often depicted as a counterpart for the mathematical realm. As emphasised, Aristotelian passages also suggest that Speusippus' reason for mathematical number to exist and be separated is rooted into a different ontological conception of mathematical and sensible objects.

However, trying to determine precisely what the content of Speusippus' enquiry into the sensibles was, is a much harder task. Xenocrates and Aristotle are also credited with books on *Divisions*, and, in general, scholars agree on recognising the diairetic method as a fundamental procedure of classifications within the Academy. As for Speusippus, the taxonomic organisation of reality seems to be arranged according to the criteria of similarity, or ὁμοιότης. Hence, sensible objects are organised in groups according to the similarities they entertain and (possibly) arranged in groups according to species and genera, as the title *Examples of Genera and Species* seems to confirm. Given these premises, it would be at

³⁴⁸ Note the similarity in formulation of (i) ὅτι οὐκ ἔσονται αὐτῶν αἱ ἐπιστῆμαι ἐλέγετο at line 28, and (ii) ὅτι ἐπὶ τῶν αἰσθητῶν οὐκ ἔσται τὰ ἀξιώματα at lines 36-37.

least incautious to dismiss the sensible realm quickly. Attempts to make justice of the fragments, mostly preserved in Athenaeus' *Deipnosophistae* and belonging to Book II of Speusippus' Ὅμοια, the *Similar*s, have been done in the past; in particular, Lang³⁴⁹ attempted a reconstruction of the whole system of Speusippus' arrangement of the sensibles into genera and species, and Tarán³⁵⁰ thoroughly analysed the material in order to mitigate Lang's tendency to collapse with excessive confidence the Aristotelian divisions onto Speusippus' material. I generally agree with Tarán's conclusion about the material preserved, and with his caution in projecting, or making excessive use of, Aristotle's methods and divisions for the understanding of Speusippus' taxonomy. Building from Tarán's main conclusions, I would like to emphasise some aspects that can be helpful for our purposes. Indeed, what I believe to be missing from scholarly accounts of the sensible realm, for however detailed they may be, is precisely a philosophical consideration of the sensibles within Speusippus' system as a whole. For I believe Speusippus' philosophical choices, and his decision to operate interventions in his system can be properly appreciated only when understood in light of his epistemological commitments. If a (mainly) dualistic ontology was already part of the Platonic legacy Speusippus inherited, it is the symmetrical separation of the sensible and mathematical realms in view of a distinction of their diverse epistemological practices that should be appreciated as a unique Speusippean contribution.

Given this background, this section will analyse the biological fragments preserved by Athenaeus, so to complement the information obtained from Aristotle's passage. The *aim* is *not* to provide new information about Speusippus' biology, but, rather, to show that the conclusions reached so far cannot be disproved by them.

As for Speusippus' Ὅμοια, all the fragments preserved have as their subjects either animals or plants, since this was probably the focus of (at least) book II of the *Similar*s. Essentially, the fragments can be subdivided in the following groups:³⁵¹

- i. Group **(i)**: Fragments establishing the similarity between a group of sensibles (frr. 8; 12a; 12b; 18; 20; 22; 23; 24 Tarán).
- i. Group **(ii)**: Fragments establishing that a single item is similar, or akin, to others (frr. 10; 15 Tarán).
- ii. Group **(iii)**: Fragments which establish the similarity of the objects by

³⁴⁹ P. Lang (1965: 7-20).

³⁵⁰ L. Tarán (1981: 244-257).

³⁵¹ Leaving aside those fragments only attesting to Speusippus' terminology.

referring to a bigger group (sometimes called εἶδος. See fr. 9 (μαλακόστρακα); 11 (κώνωπος εἶδος); 17 (πολύποδα) Tarán).

iii. Group (iv): Fragments establishing the similarity between two specific objects (fr. 6; (12c); 14; 16; 21 Tarán).

The terminology used to establish the ‘similarity’ between sensible objects varies between εἰκός (1) παραπλήσιον (7), ὅμοιον (6), ἐμφερής (2), and it may or may not belong to Speusippus. Whether we can take all the vocabulary to belong to Speusippus or not, what is important is that the terminology used, in general, calls attention to a *reciprocal relation between the objects in questions*. Obviously, Speusippus must have had criteria which justified the similarity between the objects and which, ultimately, could be appealed to in order to arrange the classifications; however, from the fragments preserved it is hard to establish what these criteria were: fragments preserved analyse an item, or, more often, a group of items, which are said to be similar to one another; there is any reference to a unifying factor. This may suggest, for Speusippus’ practice, an empirical and collective process of classification of the objects in question, rather than a theoretically organised and fixed taxonomy. Indeed, both the vocabulary used to establish the similarity between the objects under analysis and the suggestion of a reciprocal relation between the objects (sometimes in not immediately intuitive groupings) suggest that the classes were constructed through an empirically-based classificatory process. The problem here is that the information at our disposal is so meagre that it is hard to propose conclusive suggestions at all about how the classes were constructed. To give an example, Tarán argues that one of the criteria used by Speusippus was the reference to the habitat, a criterion Aristotle strongly criticised in *Parts of Animals* (642b10-13). According to Tarán, this criterion encourages us to identify Speusippus as the target of Aristotle’s criticism and to add information about his method: a rigid dichotomic method of *diairesis*. However, the fragment taken by Tarán³⁵² as testifying that habitat was indeed considered a criterion for classification, reads as follows:

Σία. Σπεύσιππος ἐν δευτέρῳ Ὁμοίων φησὶ ἐν ὕδατι γίνεσθαι, σελίνῳ ἐλείῳ τὸ φύλλον εἰκός.

³⁵² Tarán, fr. 6 (= 123 IP₁), (1981: 246ff). Also Cherniss (1944: 57) refers to the importance of the habitat for Speusippus. For Cherniss, the connection with Aristotle’s system of classification is granted by a class of items which appears in both authors, i.e. that of the polypides, in relation to which Aristotle raises difficulties regarding their natural habitat. However, such connections cannot be considered as conclusive, given the scarce material attesting to Speusippus’ criteria for classifying sensible objects, and given that we have no hints about what these criteria actually were. Moreover, in Cherniss’ analysis, it is Aristotle’s comment on the habitat of the polypides that makes the reference to the habitat significant for Speusippus as well. But the mention of the same class, and the reference to the habitat in the present context do not attest, separately, that the habitat was indeed a criterion for Speusippus’ classifications.

Literally, the fragment reads: ‘Marshwort. Speusippus, in the second book of the *Similar*s says that (it) grows in water, and that the leaf resembles to marsh-celery’. The most natural way to read the sentence is to take the two infinitive clauses (γίνεσθαι; ἔοικός [εἶναι]) dependent on the φημί as coordinate clauses. But if the two clauses are coordinate, there is no way to read the former as explaining the latter; namely, there is no way to read the fact that marshwort grows in water as a justification for its similarity with marsh-celery. Indeed, even in Athenaeus’ text,³⁵³ the appeal to the habitat as an explanation is connected to Ptolemy Euergetes the Second, king of Egypt, who is told to propose a correction in Homer’s text by substituting ‘violet and celery’ with ‘marshwort and celery’; for both marshwort and celery grow in water, while violet does not. Therefore, in Speusippus’ fragment the similarity is established by appeal to the likeness the leaves of the two plants share, a factor that may weigh in favour of an observational and empirical practice. It is the similarity between the two leaves, and, in general, the web of relationships an object entertains with others, that helps us to understand the object itself and the class it belongs to. However, this is the only fragment in which any description of the sensible object under investigation appears, and in absence of more *testimonia*, we must be cautious in advancing answers.

Another interesting aspect is that the reciprocity in the relationship of similarity can also be detected in most cases in the way objects are listed in the Greek. Indeed, although the sample is quite limited, we should nevertheless try to work with what we have. In group (i), where groups of items are listed, all items share the same grammatical case.³⁵⁴ In group (ii) the situation is slightly different, since the relation of similarity established is of the type: 2 items - 1 item; accordingly, the two terms of the relation are obviously distinguished and one is expressed with the dative. Interestingly enough, however, the two fragments preserved for group (ii) establish such relation indifferently: the relation of similarity is not only expressed with the formula: 2 items \cong 1 item (dative), but also with the formula: 1 item (nominative) \cong 2 items (dative).³⁵⁵ Hence, even here, there is no reference to a third item which establishes the similarity, but, rather, this seems to be played by a horizontal relation that the items share as a group. Group (iii) organises the items into larger groups and, accordingly, the macro-class is usually expressed with a genitive, while the items that fall

³⁵³ See, Athen. *Deipnosoph.* 61c, where the reference to marshwort interrupts the discussion on mushrooms, continued after.

³⁵⁴ E.g., fr. 22 Tarán (= Athen. II, p. 214, 24-26): Σπεύσιππος δ’ ἐμπερὴ φησιν εἶναι **κόκκυγα, χελιδόνα, τρίγλαν**.

³⁵⁵ See, e.g. fr. 15 Tarán: Σπεύσιππος δ’ ἐν δευτέρῳ Ὀμοίων ὁμοιά φησιν εἶναι **τῇ μανίδι βόακα καὶ σμαρίδας**, and fr. 10 Tarán: Ἔστιν δ’ ἡ **κερκώπη** ζῷον ὁμοιον **τέττιγι καὶ τιτιγονίῳ**, ὥς Σπεύσιππος παρίστησιν ἐν δ<ευντέρῳ> Ὀμοίων.

under it all share the same case.³⁵⁶ Lastly, group (iv) is a very interesting example. Indeed, most cases (3 out of 5) present a relation of similarity of one thing *to* another and, in those circumstances, the second term is expressed with the dative.³⁵⁷ However, one of these cases (fr. 12c Tarán), which expresses the relation of similarity precisely in this way (Σπεύσιππος δ' ὅμοιον φάργῳ τὸν ἥπατον) lists two items occurring in two other collections of the type of group (i), (i.e. fr. 12a; 12b Tarán).³⁵⁸ Accordingly, the relations of similarity so presented might in reality be an extrapolation of Athenaeus from groups that were originally listing more items together, as in the case of group (i).

What complicates the situation even more is that there is only *one* fragment attesting to the difference between objects, where Speusippus distinguishes between the male and the female tuna. The same differentiation is attested in Aristotle as well (*History of Animals*, 543 a 14ff; 543 b 11ff), who refers to the female tuna as having a small fin beneath its belly, differently from the male tuna. If this is the same explanation Speusippus appealed to,³⁵⁹ and if, accordingly, male and female tuna really belonged to different classes in Speusippus' taxonomy, we might conjecture that in order to trace similarity and difference between sensible objects, a great dose of observation of plants/animals was required even for objects of the same 'kind'.³⁶⁰

The topic of differentiation is closely connected to a) an intricate discussion about Speusippus' method of definition (Aristot., *A.Po.* II, 13, 97 a 6 ff = fr. 38 IP₁) and b) a testimony preserved by Sextus on Speusippus' criteria of truth which, however, would leave us astray from the present purposes if addressed in detail.³⁶¹ I briefly mentioned the first point in Chapter 2, in the context of providing an explanation of why participation represented a problem Speusippus had in mind, and of his decision to formulate his world as episodic. In brief, the testimony attests that, according to some people³⁶² it impossible to

³⁵⁶ See, e.g. fr. 17 Tarán: Εἶδη δ' ἐστὶ πολυπόδων ἐλεδώνη, πολυποδίνη, βολβιτίνη, ὁσμύλος, ὡς Ἀριστοτέλης ἱστορεῖ καὶ Σπεύσιππος.

³⁵⁷ See, e.g. fr. 16 Tarán: Ὅμοιον δὲ εἶναι τῷ μελανούρῳ φησι Σπεύσιππος ἐν δευτέρῳ Ὅμοίων τὸν καλούμενον ψύρον.

³⁵⁸ See, fr. 12a Tarán: Ἀριστοτέλης ἐν τῷ περὶ ζώων καὶ Σπεύσιππος παραπλήσιά φησιν φάγγρον, ἐρυθρίνον, ἥπατον. Obviously, another reason for the difference in the case is related to the words chosen to denote the similarity (here παραπλήσιον in fr. 12a and 12b, while ὅμοιον in fr. 12c.)

³⁵⁹ Funny enough, since tuna do not present any sexual dimorphism, and accordingly, male and female are undistinguishable on the basis of macroscopic differences, especially since their sex is not determined at their birth but is later defined on the basis of environmental as well as other circumstances. See, e.g., Santamaria, Bello and *alia* (2009: 41).

³⁶⁰ I use kind here generically, to mean animals of the same species.

³⁶¹ For a detailed discussion of the topic and different reconstructions of the argument see Falcon (2000). At the recent conference *Metaphysics and Epistemology in Plato's Academy*, Benatouil convincingly connected the discussion to the context of the *Theaetetus*.

³⁶² Identified with Speusippus by an Anonymous commentator of the *Posterior Analytics* (see fr. 39 IP₁).

know the differences each thing entertains with other things unless one knows everything severally. Ancient commentators (probably influenced by Eudemus' reading of the doctrine) take the argument as against the possibility of definition. The argument has been read differently by scholars,³⁶³ who have reconstructed the order of the claims in various ways. In general, I agree with Horky's conclusion that 'Speusippus is not to be credited here with any sort of proto-sceptical argument that a regress implies that no essence can be known whatsoever'.³⁶⁴ On the contrary, if read positively, the testimony goes in the direction of affirming the need to differentiate the objects under analysis, if one wants to gain (some) knowledge about them. Accordingly, it seems likely that the whole procedure of knowing sensible objects implied both the collection of objects in groups of 'similars' (possibly, to be able to distinguish them from other groups) and the distinction of the individual sensible object itself even from items of the same 'kind'.

The topic of knowledge, and its relation to sensible objects leads us to b), a passage in which Sextus Empiricus³⁶⁵ presents Speusippus' criteria of knowledge. I don't want to linger on the testimony too much, since the identification of Sextus' source for the material is a vexed question,³⁶⁶ but there are at least two aspects which are connected to our discussion. Indeed (1) Sextus divides Speusippus' objects in two kinds: τὰ νοητά and τὰ αἰσθητά. Perhaps, this very distinction between objects is, more generally, reminiscent of a Platonic dichotomy. Although attempting an identification between Speusippus' mathematical realm and 'τὰ νοητά' might not be totally orthodox, at the same time, such an identification would reiterate the idea of a unitarian conception of the mathematical realm as I was suggesting. What is even more interesting is (2) that Sextus gives us two different criteria for the objects in question: criterion of intelligible objects is the ἐπιστημονικὸς λόγος, or scientific discourse, whereas criterion of sensible objects is the ἐπιστημονικὴ αἴσθησις, or scientific sense-perception.³⁶⁷ If the material Sextus is preserving is even slightly trustworthy, this would confirm some of the suppositions previously advanced: the symmetrical separation of the two levels is, first of all, necessary. For, if some knowledge of the sensible world is

³⁶³ Very differently interpreted: see, Cherniss (1962: 42); Isnardi Parente (1980: 256-260); Tarán (1981: 390); Barnes (1994: 245-247); Falcon (2000); Dillon (2003: 79-80), Burnyeat (1990 *ad loc.*); Horky (2018: 36-37).

³⁶⁴ Horky (2018: 37) argues that the question of 'knowing every single thing' might be solved if one takes Speusippus to uphold a theory of recollection such as Plato's. This way, a 'previously' obtained knowledge about each and every thing might be reactivated through discursive thinking.

³⁶⁵ Sext., *Adv. math.* VII, 145-146 (=fr. 34 IP₁).

³⁶⁶ See, e.g. Sedley's comment (2012: 102-103): 'Consider, then, another aspect of the same Sextan doxography. No one, as far as I can recall, has defended as fully reliable its reports of Speusippus, Xenocrates and the Peripatetics (*Math.* 7.145-9 and 217-26), and according to the argument I have developed in this chapter that implicit distrust is well-founded. For they too are parts of the material from Antiochus' *Canonica*, driven by the same radically syncretistic agenda as generated the distortion of *Timaeus* 27d-28a'.

³⁶⁷ On Sextus' testimony, see Isnardi Parente (1969) and (1992), and, more recently, Dillon (2018).

granted, it will require practices and methods that are different from those required for the mathematical realm. Accordingly, as argued previously, the separation of the levels would work in the direction of rendering each of them independent, granting epistemological autonomy (*and* differentiation) to the two practices.

Before concluding this short overview of Speusippus' consideration of the sensibles, I believe there is one last aspect which requires clarification: the notion of ὁμοιότης. Although scholars generally agree on advancing such a concept for explaining both Speusippus' arrangement of sensible objects and for demonstrating that Speusippus' system did have some internal coherence, ὁμοιότης is not as an intuitive a notion as it seems.

First of all, similarity can be intended in at least two ways: literal similarity, or analogical similarity. Literal similarity statements imply the presence of two objects that entertain a symmetrical relation of likeness, and are of the form 'cherries are like olives'. These kinds of statements are obviously reversible (at least in principle), and the relation of similarity between the objects is hence reciprocal. Differently, analogical similarity requires at least 4 objects, as it is the relationship itself that those objects entertain which is judged to be similar; an example could be: 'lambs are to sheep as kittens are to cats'.³⁶⁸ In this second case, what establishes the similarity between the objects is the relation they entertain to each other. The reason why I am pointing the attention to these two possible meanings is because scholars, by taking Speusippus' notion of similarity from the context of the collection of the sensibles and employing it in order to justify some continuity in his system, are precisely employing the notion in these two different ways.³⁶⁹ When it comes to the collection of the sensibles, similarity takes on the literal meaning, whereas when it is understood as the unifying factor of different levels ὁμοιότης is intended analogically. Accordingly, it is hard to understand how literal similarity might be employed in order to justify continuity in the system, or what kind of relationships are pointed at (and, most of all, how precisely they work) when one affirms that the point³⁷⁰ and the One (insofar as principles) resemble one another. In what sense are they analogous? Do principles entertain an analogous relationship

³⁶⁸ Ortony (1979: 175).

³⁶⁹ See as an example, Isnardi Parente (1980: 380): 'abbandonato il terreno del puramente quantitative-matematico, passandosi nella ricerca dalla struttura generale dell'universo alla classificazione delle specie nei loro tipi il più possibile determinati, anche il criterio della ὁμοιότης perde il suo carattere rigorosamente matematico e accede a quella approssimazione che caratterizza il campo del qualitativo sensibile'. To say that the ὁμοιότης loses its mathematical and quantitative features (i.e. is intended as analogical similarity) in favor of a qualitative characterization (i.e. is intended as literal similarity) implies the appeal to two different notions, and not a conjugation of one. Moreover, the reason for such a 'descent' of ὁμοιότης, when the concept is conceived as some sort of 'unifying aspect' of Speusippus' levels, would at least deserve some clarification.

³⁷⁰ Admitting it can be taken as one of the principles in geometry.

with their consequents (they are analogous insofar they work as principles), or are they similar the basis of the way they are conceived (for example, the One and the point are both minimal constituents)? Moreover: on what basis can we expand a relationship between principles and consequents to account more generally for similarity across different levels?

A second problem arises in relation to the symmetry which should underlie literal similarity when more than one object comes into play. For, although similarity should intuitively be symmetrical (if cherries are like olives, olives should be like cherries as well), this does not seem to be the case *absolutely*. First of all, it is obvious that, in the case of more than two objects being considered as a group, the reason for their similarity is at least different from that of two objects only being compared and needs to rely on a third item, taken as a model.³⁷¹ For, when two objects *only* are compared, their similarity may appeal to at least one (but possibly more) features that the two objects share. In this case the relation is clearly horizontal and symmetrical. If we say that cherries and olives are alike, we are saying that they are both round and small, that they both have a pit, and so on. If these are the criteria on the basis of which the objects are similar, clearly the features will be shared by *both*. But when the group of objects under consideration is of at least three items, it is not necessary that the relation between the objects be symmetrical in the same way. When a group of objects are considered as similar, it seems reasonable to say there is at least one predicate that can be predicated of all of them. In this case, the similarity between the objects in question is not necessarily horizontally and symmetrical if not by mean of one predicate they all share. To build on the examples taken before, we can add peaches to the group of objects that are round and have a pit. This way, we will have the following group: cherries, olives, peaches. But obviously, the similarity between cherries and olives is not the same as that between cherries and peaches. In such groups, the similarity works in fact vertically. The objects are similar insofar as they all share one or more features assumed as those that instantiate the group. I believe that it is in this aspect that lies the main difficulty for establishing what ὁμοιότης amounts to within Speusippus' classification of the sensibles. On the one hand, none of the fragments in our possession provides us with this common predicate that the objects of the group should share. This is the case also for those fragments in which we are provided with a macro-grouping, sometimes referred to as an εἶδος. First, in none of those fragments we find a description of the macro-group; secondly, some of those macro-groupings are not even immediately intuitive: if we think of the kind of the mosquitos (κόνωπος εἶδος),³⁷² it is not clear (i) why that of mosquito should be a kind, and especially,

³⁷¹ The asymmetry I am pointing at here is that between the items listed in the group, or, in other terms, some sort of horizontal likeness.

³⁷² Fr. 11 Tarán (= Photius, *Lexicon*, s.v. πῆνιον (II, pp. 88-89)).

(ii) why the moth (πήνιον) should fall under it.³⁷³ Accordingly, we can certainly imagine groups for those objects to fall under, but we do not have suggestions as to what these should be *precisely*. Moreover, the relation of similarity between groups of sensible objects was felt to be problematic for Plato as well,³⁷⁴ and, in particular, when related to the relationship original-copy in the context of the resemblance between Forms and particulars. Indeed, a standard Platonic answer to the problem would be to say that sensibles grouped within a set are similar to one another because they all participate into the idea of Likeness. However, whatever way one accounts for such relationship, this relies precisely on some ontological/causal/paradigmatic dependence of the sensibles onto the Forms. But this aspect is precisely what is lacking Speusippus' account in two particular respects: a) the absence of the Forms and b) the absence of ontological dependence of one level onto another. Under these circumstances, and in absence of decisive arguments, it may be plausible to think that Speusippus' collection was a sort of empirical collection of items, rather than an already fixed taxonomy.³⁷⁵ This way, the vehicle for the similarity (the element on the basis of which the groups are organised) might have been a sensible particular itself, and classifications might have varied according to the circumstances. Or, maybe, the macro-groups (i.e. genera and species), instead of having a middle term as a referent, were conversely constructed on the basis of the group itself (having a creative middle term). To conclude, what continues to be problematic is precisely the notion of ὁμοιότης itself. For, in the absence of precise criteria on which to establish such a notion, similarity is potentially traceable between any pair of objects, by reference to some predicate they share: if this is the case, it is clear why differentiation should play a very decisive role in attaining knowledge of sensible objects.

4.2 The hunt for knowledge: Proclus' report of Speusippus' epistemology in the *In Euclidem* (fr. 35)

This last section is meant as an ultimate test of the results obtained until now. In fact, the account of Speusippus, preserved in Proclus' *Commentary on the First Book of Euclid's Elements*, represents, in many ways, the counterpart of some of my claims about Aristotle's *testimonia*. In Chapter 2, I argued that Speusippus' postulation and conception of first principles work as a direct response to the Platonic problem of participation to the Forms, in view of a 'correction' of the system which aims at a better sustainability from an

³⁷³ Tarán comments that this was not contended by Speusippus (while Lang does 1965:15), and he suggests that Speusippus posited a different and higher class for the insects listed here (differently, Lang suggests as a macro-class the Aristotelian έντομα δίπτερα έμπροσθήκεντρα, i.e. the class of two-winged dipterous insects).

³⁷⁴ See, Sedley (2006), and Schofield (2004).

³⁷⁵ Some scholars (see, Isnardi Parente and Tarán) also agree that the groupings we have may represent a first stage of the process, namely, that of the collection of the objects, to be later organised into genera and species.

epistemological point of view. Indeed, although the ‘episodicity’ of Speusippus’ system is harshly criticised by Aristotle for the disruption it creates, nevertheless this choice reveals to be epistemologically valuable inasmuch as it allows an independent and distinct inquiry into different kinds of object which do not need to rely on anything else for their intelligibility. Chapter 3 and section 4.1 have analysed, respectively, the mathematical and the sensible realms, so to highlight the independence each one is granted with, and the unitarian consideration they receive specifically. Given this premise, I believe that Proclus’ passage confirms such suppositions. Indeed, the fragment I am about to focus on is usually connected to the broader geometrical context in which it is preserved and to Proclus’ previous discussion about axioms and postulates. In the following sections I will a) question the exclusively mathematical/geometrical context usually attached to the fragment which strongly influenced its translations; and b) advance a new interpretation of the text that prevents an exclusively geometrically-related reading of it. Given these premises, the fragment will expose the broader significance of the fragment within Speusippus’ epistemology so to demonstrate the plausibility of my reading and prepare the background for next chapter. As Chapter 5 will be dealing with primary principles specifically, a comprehensive knowledge of Speusippus’ philosophy is required. To these purposes, the section will be organised as follows:

Section 4.2.1 will present the fragment within the context of its preservation and offer a brief overview of its scholarly reception. The aim of such section is to establish to what extent we should believe the initial sentence, sometimes included in the selection of the fragment itself, and the context in general, to be genuinely Speusippean.

Section 4.2.2 will examine the two kinds of object the fragment alludes to (τὰ μὲν - τὰ δέ) and will attempt to provide limits for their identification.

Finally, section 4.2.3 will illustrate why a different interpretation of the fragment is valuable and will explain the advantages of such interpretation in light of Speusippus’ epistemological theories. Accordingly, in order to introduce the topic, I will provide first the Greek text of the passage, together with my translation of it. As it will be clear from the following considerations, my intention is not that of questioning other grammatical constructions of the passage, which, I believe, can be constructed in at least two different ways by maintaining a very similar outcome in terms of meaning. On the contrary, my aim will be that of questioning the exclusively mathematical/geometrical reading of the passage. Accordingly:

[FR. 35]

[δεῖ γάρ
δὴ πανταχοῦ τὰς ἀρχὰς τῶν μετὰ τὰς ἀρχὰς διαφέρειν
τῇ ἀπλότητι, τῷ ἀναποδείκτῳ, τῷ αὐτοπίστῳ]. καθόλου
γάρ, φησὶν ὁ Σπεύσιππος, ὧν ἡ διάνοια τὴν θήραν
ποιεῖται **τὰ μὲν** οὐδεμίαν ποικίλην ποιησαμένη δι-
έξοδον προβάλλει καὶ προεντρεπίζει πρὸς τὴν μέλλου-
σαν ζήτησιν καὶ ἔχει τούτων ἐναργεστέραν ἐπαφὴν
μᾶλλον ἢ τῶν ὁρατῶν ἢ ὄψις, **τὰ δὲ** ἐκ τοῦ εὐθέως
αἶρειν ἀδυνατοῦσα κατὰ μετάβασιν ἐπ' ἐκεῖνα δια-
βαίνουσα κατὰ τὸ ἀκόλουθον αὐτῶν ἐπιχειρεῖ ποι-
εῖσθαι τὴν θήραν.

[Principles must in every case differ from what follows after them in simplicity, indemonstrability, and self-evidence]. For generally, says Speusippus, of the things which thought (διάνοια) hunts after, some (τὰ μὲν) it puts forward and prepares [them] for the coming enquiry without having undertaken any sort of elaborate excursion, and it has with them a clearer contact than sight has with visual objects; but because [it] is unable to catch others (τὰ δὲ) immediately, [it] attempts to hunt after according to their (viz. of τὰ δὲ) congruency/correspondence/conformity³⁷⁶ (κατὰ τὸ ἀκόλουθον), by crossing [them] (διαβαίνουσα [τά δέ]) with a transition (κατὰ μετάβασιν) over these (ἐπ' ἐκεῖνα; viz. τὰ δέ³⁷⁷).³⁷⁸

4.2.1 Context and traditional scholarly interpretation

The fragment finds its place at the beginning of Proclus' section on postulates and axioms. As he says, principles of geometry can be of three kinds: hypotheses, postulates and axioms. Since Proclus believes the differences between these three have been sufficiently explored in other parts of his *Commentary*, he sets aside the discussion of hypotheses and explains that the chief subject of inquiry in the section will be the difference between postulates and axioms. It is at this point that Speusippus' quotation is presented. Indeed, before anything else, the extract affirms the priority of principles, explicating it in terms of simplicity,

³⁷⁶ Taking the meaning from ἀκόλουθον + genitive, 'in conformity with' LSJ 3 (as in Plat., *Phaed.* 111c). For the meaning of the word in the Platonic *corpus*, Ast (1953) reads 'consequens, coniunctus, etiam similis'.

³⁷⁷ For the coincidence of the object of ἐκεῖνος and αὐτός (also in this order) see Smyth (2005) 1258. I take the two clauses to be stilistically constructed in parallel. Both τὰ μὲν and τὰ δὲ are placed in an emphatic position, and function as objects. Just as in the first clause, τὰ μὲν is the object of προβάλλω and προεντρεπίζω I take τὰ δὲ to be the object of both αἶρέω and διαβαίνω. With this construction, the sentence shows a second parallelism between the two clauses constructed with the circumstantial participles: 'οὐδεμίαν ποικίλην ποιησαμένη διέξοδον' and 'ἐκ τοῦ εὐθέως αἶρειν ἀδυνατοῦσα' which, also in terms of meaning, can be considered complementary. A second option for the construction (as in Bénatouil and El Murr 2010 and Horky 2018) would be to take διαβαίνω with ἐπ' ἐκεῖνα; this way, διάνοια would advance towards (τὰ δέ), rather than crossing them. Opting for this second construction, the second sentence could be translated as follows: 'because it is unable to grasp others (τὰ δέ) directly, [it, sc. διάνοια] advances over them with a transition and attempts to hunt after according to their (αὐτῶν) congruency' [sc. of what follows from τὰ δέ]. The αὐτῶν as well is placed in an equivocal position, as it can be taken both as referred to ἀκόλουθον (i.e. their congruency, sc. of τὰ δέ) and with ἐπιχειρεῖ ποιεῖσθαι τὴν θήραν (i.e. hunts after *them*). However, I don't take αὐτῶν to be referred to τὰ μὲν, as does Horky.

³⁷⁸ Procl., *In Eucl.*, 179, 12-22 Friedlein. I used as a model for my translation Horky (2018: 33). Our translations diverge especially in the last sentence.

indemonstrability and self-evidence, and then introduces two different objects that διάνοια hunts after: τὰ μέν and τὰ δέ. Even though both the existing collections of Speusippus' fragments³⁷⁹ do include lines 12-14 (namely, those on the priority of principles) in the selection of the text, both dismiss them as part of the quotation.³⁸⁰ Nevertheless, the presence of those lines does actually inform the scholarly discussion of the fragment and its interpretations. On the one hand, Isnardi Parente speaks of two different kinds of knowledge, the first immediate while the second poietic, but locates them *both* within the domain of mathematical knowledge;³⁸¹ on the other hand, Tarán speaks more explicitly of a distinction 'between the knowledge of *indemonstrable principles* and the knowledge that derives from them'.³⁸² To my knowledge, the only real alternative option for the interpretation of the passage has been provided by Bénatouïl and El Murr,³⁸³ who argue that the processes described may be interpreted in two different ways, according to the stress one lays either on the references to the *Republic* and to the metaphor of the hunt (i) or on the initial καθόλου (ii). In the first case (i) the two processes would describe [τὰ μέν] the different procedures of the mathematician (both demonstrative and constructive) and of the philosopher [τὰ δέ]. In the second case (ii), both processes would underline the point of contacts between geometry and dialectics. For already for Plato 'les deux recherches s'appuient sur des hypothèses évidentes à la pensée pour atteindre d'autres objets. L'une descend vers des objets objectivement plus complexes' [τὰ δέ], 'alors que l'autre remonte vers des principes plus fondamentaux mais plus difficiles à saisir' [τὰ μέν].³⁸⁴

I will take into account their analysis in the course of my examination, as our analyses converge on many aspects of the fragment although diverging on the identification of the objects in question.

First of all, then, should we accept such context and interpret the fragment congruently, as referred to principles and embedded in a mathematical/geometrical discussion only?

The main reasons for scholars to interpret the discussion as related to mathematical and

³⁷⁹ See, Tarán, fr. 30 and Isnardi Parente, fr. 35.

³⁸⁰ In the online edition of the fragments (2005, *Commento* (a): 2-3 F2), Isnardi Parente changes her mind and accepts the first lines as reflecting Speusippus' thought. Her second interpretation (although distinguishing between an intuitive and discursive kind of knowledge) is very close to mine. Indeed, she takes discursive knowledge to refer to sensibles as well.

³⁸¹ At least this seems to be the case for the first collection of Speusippus' fragments, where Isnardi Parente considers this possibility probable (1980: 249) and invites further philosophical considerations of the passage. In the revised online version, Isnardi Parente is much more careful in regard to the identification of the objects and the location of the two kinds of knowledge and does not provide any of the two (pp. 2-3).

³⁸² Tarán (1981: 427). See also comments to fr. 72-74 (Tarán's numeration), (1981: 422-431). Similarly, Horky (2018).

³⁸³ Bénatouïl-El Murr (2010: 41-80).

³⁸⁴ Ead. (2010: 61).

geometrical practices *exclusively* is provided not only by the mathematical context of Proclus' quotation, but, most of all, by Plato's own discussion of mathematics and geometry in the *Republic* (books VI and VII in particular), a text which offers a plausible background for the topics under analysis. It will be impossible, in the present context, to offer a detailed comparison of the two texts.³⁸⁵ As a matter of fact, it is not my intention to deny that the context of *Republic* lies in the background, nor to exclude that mathematical and geometrical practices are here considered *at all*. By contrast, I want to argue that mathematical and geometrical practices represent only *part* of the discussion, which, however, needs to be complemented. To this purpose, the only passages of the *Republic* I will take into account are those scholars considered fundamental in order to shed light on the passage under consideration.

As Bénatouïl and El Murr note,³⁸⁶ a first link between Speusippus' doctrines and the discussion of geometry in the *Republic* can be identified by reference to [FR. 36] where Proclus introduces the dispute between Speusippus and Menaechmus.³⁸⁷ The similarity in terminology is certainly striking; in the *Republic*, Plato distinguishes discourses (λόγοι) the geometers make 'for the sake of business' (πράξεως ἕνεκα, 527a7) and those made 'for the sake of knowledge' (γνώσεως ἕνεκα, 527b1) just as Proclus provides a distinction between a γνωστικῶς and a ποιητικῶς perspective concerning the objects of theoretical science. And this must be right: as they say, Speusippus is proposing an alternative view to that of Plato, according to which the hypotheses and demonstrations of the geometers are *the means by which* we get to know objects which exist eternally.³⁸⁸

In light of this connection and on the basis of a third passage of the *In Euclidem*, Bénatouïl and El Murr offer a first possible interpretation, which is consonant with the interpretative direction of most scholars.³⁸⁹ The passage they refer to, which is provided in order to offer a link between Speusippus' and Menaechmus' discussion, [FR. 36] and the fragment under analysis here [FR. 35] reads that:

[FR. 4 IP₂] some people deemed right to name all of them [non-demonstrable principles] 'postulates', in the same way [they called] 'problems' all the things which are sought (τὰ ζητούμενα πάντα); [...] while others named [them] 'axioms', in the same

³⁸⁵ Bénatouïl and El Murr's discussion of the status of geometry in the *Republic* is particularly accurate and detailed (2010: 40-57).

³⁸⁶ Ead. (2010: 58).

³⁸⁷ Procl., *In Eucl.*, 76, 11-21 Freidlein. See *infra* section 2.3.

³⁸⁸ And the ὡσανεὶ in Proclus' text recalls the ὥς Socrates uses at *Resp.* 527a6, Bénatouïl and El Murr (2010: 58).

³⁸⁹ Bénatouïl and El Murr (2010: 60) do agree that such interpretation is not necessary nor the only possible and that, once tested more accurately, it reveals not to be consistent with the content of Proclus' passage [FR. 35]. I will incorporate their comments in my analysis of the fragment.

way [they called] ‘theorems’ all the things which are in need of a demonstration (τὰ ἀποδείξεως δεόμενα).³⁹⁰

In light of the passage, the focus of the dispute between Menaechmus and Speusippus is broadened; it did not focus on mathematical propositions only but addressed the status of principles too.³⁹¹ Accordingly, the distinction between the two kinds of objects in [FR. 35] should be understood as that between undemonstrated principles (ἀξιώματα) and things in need of a demonstration (θεωρήματα).

What is problematic given my methodological assumptions, is that the term ‘ἀξιώματα’, here interpreted as undemonstrated principles also occurs in Aristotle³⁹² where it retains a much more general meaning.³⁹³ As my choice is to take Aristotle as the primary source for my analysis, it would be at least problematic to take Proclus’ testimony as providing the framework for the distinction. What is consistent both in Aristotle’s and Proclus’ *testimonia* is the description of mathematical number or mathematical objects (Aristotle), and of the objects of theoretical sciences (Proclus), as eternal and not featuring any kind of change. Accordingly, I will take only this point as granted. Moreover, in [FR. 4 IP₂] Proclus does not name Speusippus nor Menaechmus explicitly, and the reference seems to concern Hellenistic mathematics more generally, since Archimedes is quoted in favour of the first identification.³⁹⁴

A second reference scholars usually rely upon is *Republic* 510b-511d, where Plato presents the image of the Divided Line and distinguishes between an intuitive and discursive kind of knowledge (διάνοια/νοήσις). The reference is exploited (i) in order to distinguish between an intuitive and a discursive operation of διάνοια in [FR. 35], and (ii) to establish that the objects at stake are both of a mathematical kind.³⁹⁵ Nevertheless, as Horky acknowledges, in the *Republic* ‘Forms were unambiguously the unique first principles that could be grasped by ‘intellect’ (νοῦς) [...], whereas Speusippus only speaks of grasping first principles in one of the operations of ‘thought’ (διάνοια)’.³⁹⁶ Moreover, I do not see

³⁹⁰ Procl., *In Eucl.*, 181, 21-23 = 74 Tarán. The text is not included in IP₁ (1980), although Isnardi Parente discusses it briefly in her online edition (2005, *Commento* (b): 5; F4).

³⁹¹ Bénatouil and El Murr (2010: 59, n. 35). Cf. also Bowen (1983). This issue would require further investigation, as Menaechmus is also known to have provided a ‘circular’ definition for ‘element’. See Proclus, *In Eucl.*, 72, 23–73, 14 Friedlein (=D6 Lasserre).

³⁹² Fr. 80 IP₁ = Arist., *Metaph.*, N2, 1090a35-1090b2.

³⁹³ Cf. Crubellier (1994: 484): ‘Il n’est pas certain qu’ἀξιώματα désigne autre chose que θεωρήματα aux lignes a 14-15’ and Einarson (quoted by Tarán, who disagrees with him on the grounds of a ‘better sense in the context’, 1981: 429, n. 248): ‘(ἀξιώματα) is loosely used for mathematical theorems in general, arithmetical and geometrical’.

³⁹⁴ This is the reason for Isnardi Parente to exclude the passage from genuine testimonia. Cf. IP₂ (2005, *Commento* (a): 5; F4).

³⁹⁵ See Isnardi Parente (1980: ad loc. and 2005: *Commento* (a), 5). Tarán (1981:)

³⁹⁶ Horky (2018: 35. Cf. also n.22).

convincing reasons to accept the Platonic framework only partly. Indeed, if one takes the Platonic δῖα νοῖα to be a reference, it would be natural to accept *both* its discursive nature, *and* its mathematical objects to be at stake. In other words, if the δῖα νοῖα in the passage is meant to evoke Plato's, either I do not see why one should interpret one of its processes as an *intuitive* apprehension of *principles*, or, if one does so and bifurcates the process, why maintaining its object as mathematical exclusively. In the end, also the metaphor of the hunt, although retaining a clear Platonic inheritance³⁹⁷ cannot be traced back to Plato's dialogues as unambiguously referred to mathematics. On the contrary, as Isnardi Parente notes,³⁹⁸ many occurrences of the metaphor, more broadly refer to the θῆρα τοῦ ὄντος. Moreover, extant fragments make it hard to establish what Speusippus actually thought about νοῦς and whether he employed the term at all.³⁹⁹ Accordingly, the reference to δῖα νοῖα should not lead us to quickly conclude that the only objects at stake in [FR. 35] are of a mathematical kind.

As to Proclus' quotation, lines 15-22 of [FR. 35] bear no explicit reference to the principles nor to their consequents. If we look at the Greek, after the explicit mention of Speusippus, nothing in the fragment can independently be related to principles, a discussion on axioms or postulates in which the text is grounded, or a discussion exclusively related to mathematics and geometry. On the contrary, the fragment refers generically to the objects δῖα νοῖα hunts after and designates them with an uncharacterised neuter plural as τὰ μὲν and τὰ δέ. In this respect, lines 12-14 clearly sound introductory, as they provide a context in which to place the quotation that is, on the contrary, unqualified.

Moreover, the quotation of Speusippus' begins with a καθόλου. This suggests that either Proclus, in inserting the quotations, needs to broaden the discussion in order to quote Speusippus' opinion, or that Speusippus himself was making a general claim about the objects hunted by δῖα νοῖα. In either case, the position of the καθόλου at the beginning of the sentence should at least warn us about the difference of the content quoted in respect to the previous context.

I hope this will suffice for the momentary exclusion of the lines preceding the fragment. As for the lines which follow it, and provide examples for the processes undertaken by δῖα νοῖα, we have reasons to exclude that they can be attributed to Speusippus as well; since

³⁹⁷ *Phaed.* 66a; *Politicus.* 285d; *Soph.* 220b and 261a; *Phileb.* 65a.

³⁹⁸ E.g., *Phaedo* 66c2, *Gorgias*, 500d1, *Theaet.* 198a7. For an analysis of the metaphor of the hunt in Plato's dialogues, see Bertolini (2017) and Aronadio (2014). On Plato's complement of metaphors with specific sciences see Auffret (2013), (quoted by Rashed 2013b: 218, n. 2). According to Auffret: 'Selon une métaphore constante chez Platon, la chasse pourrait figurer l'arithmétique/logistique; la peinture, liée à la surface, la géométrie plane; la menuiserie produit des artefacts solides; enfin l'agriculture des solides en mouvements'.

³⁹⁹ Horky (2018: 34).

the majority of the scholars agree on this,⁴⁰⁰ I will only offer a short explanation as to why.

Speusippus' quotation is followed by four geometrical examples; a) and b) are quoted as examples of the first kind of knowledge, while c) and d) of the second. The examples are as follows:

- a) drawing a straight line from a point to a point;
- b) considering one of the two ends of a straight line as stationary, while the other end moves around as a process which describe a circle;
- c) constructing a one-turn spiral;
- d) constructing an equilateral triangle.

The examples introduced hint at the *ῥύσις* theory, which I don't take to be ascribable to Speusippus, but has been acknowledged as Speusippean by Cherniss.⁴⁰¹ However, as Isnardi Parente underlines,⁴⁰² Speusippus seems not to have granted great consideration to *κίνησις*, which appears only within his definition of time, but would play a fundamental role in the theory of the flow. If we take the reference to time to be significant, we can suppose, at most, that the role of *κίνησις*, for Speusippus, was relegated to the domain of sensible objects, since mathematical objects, on the contrary, do not allow any kind of change.⁴⁰³

Moreover, the four examples listed, perfectly fit Proclus' distinction between *ἀξιώματα* and *αἰτήματα*⁴⁰⁴ (for which, by the way, there is no other evidence for Speusippus), and their connection with postulates and problems.⁴⁰⁵ Indeed, cases a) and b) work as examples of postulates, while c) and d) as examples of problems.⁴⁰⁶

Also, besides fitting perfectly into Proclus' previous distinction, the examples also

⁴⁰⁰ See Lang F 73, 8, who argues that the reference ends with *θήραν* at line 22; Isnardi Parente (1980: 316-317) refuses both kinds of examples; El Murr and Bénatouïl agree that examples are Proclus' own, but they understand them as clarifying Speusippus' position. Tarán (1981 and 2001) refuses the second kind of examples (1981: 427-428; 2001: 581-583); *contra*, see Cherniss (1945: 396-397, n. 322), who, however, relies on the *ῥύσις* theory for the identification. Horky (2018) does not explicitly dismiss the examples, but, as El Murr and Bénatouïl, he uses them to clarify the discussion.

⁴⁰¹ See, Cherniss (1945: 396-397).

⁴⁰² IP₁ (1980: ad loc, fr. 35).

⁴⁰³ See, Procl., *In Eucl.*, 77,7ff Friedlein, as well as Aristotle, *Metaph.* N5 1092a21-1092a24; 1092a29-1092b5 analysed in Chapter 4.

⁴⁰⁴ Cf. Procl., *In Eucl.*, 76,4ff Friedlein, where Proclus distinguishes axiom, postulate and hypothesis 'according to Aristotle'. McIsaac (2014), for example, reports [FR. 35] two times as evidence for Proclus' own view about the self-evidence of the principles and Speusippus' fragments are not even included in his bibliographical references.

⁴⁰⁵ Procl., *In Eucl.*, 179 Friedlein.

⁴⁰⁶ Procl., *In Eucl.*, 181 Friedlein. The second two examples correspond to what Proclus lists as *problems*. Moreover, this also squares perfectly with the Euclid examples Proclus is drawing on. Indeed, proposition 1 of book 1 of Euclid's *Elements* (Eucl., *El.* I 1.1-2), reads: 'To construct an equilateral triangle on a given finite straight-line' (note that this corresponds to example d) and is, in Euclid, a problem, and that in the demonstration it makes use of the first postulate, namely example a). On the distinction of problems and theorems in the Academy, see Bowen (1983) and Tarantino (2010).

contradict [FR. 36].⁴⁰⁷ For [FR. 36] states that, as to theoretical sciences, Speusippus argued in favour of the name θεωρήματα and rejected the name προβλήματα. But what Proclus concludes right after Speusippus' quotation is directly connected to *postulates*, and to *problems*, and not to axioms and theorems.

Lastly, as Proclus uses the same notions and vocabulary other times when he is discussing Euclidean postulates, this makes very implausible for him to be referring to Speusippus specifically when he exploits them here.

This brief overview should have exposed the limits of the fragment under analysis, i.e. lines 14-22. Now, as the fragment presents two different kinds of objects, τὰ μὲν and τὰ δέ, the next sections will address the identification of each kind of object separately.

4.2.2 The identification of τὰ μὲν (lines 14-19)

Although I casted some doubts about the possibility of an exclusively geometrical/mathematical reading of the lines, we are still left with the possibility that the objects easily apprehended by the διάνοια are indeed the principles, as Proclus laid out in his introductory lines, and as the fragment is located in the section about postulates and axioms. Let us see, then, if this would be coherent with the general sense of the fragment.

Precisely, in this regard a warning must first be expressed in relation to the term διάνοια. Indeed, the term can be considered in its direct connection with Plato's epistemology, in which it denotes a discursive kind of faculty, directed towards the comprehension of the mathematical level (as, for example, in the *Republic*⁴⁰⁸). If we take this reference to be operative for Speusippus, principles can hardly be the object of apprehension of such a faculty. On the other hand, if we don't want to necessarily assume a connection to Plato, we can still take the term in its broader and more general usage, as, for example, it appears in Aristotle. Indeed, if the fragment is here taking into account principles in the Aristotelian meaning, διάνοια could actually work as an appropriate faculty. However, there is no reason here to project an Aristotelian understanding onto the fragment. If we think of the way the

⁴⁰⁷ The information about the dispute between Speusippus and Menaechmus seem to reach Proclus via Geminus (see Zhmud 2006: 169-185). Indeed, Zhmud excludes Eudemos as a source because of his interest in mathematical and geometrical discoveries, rather than in philosophical interpretation of mathematics (e.g. Zhmud 2006: 169; 178). However, Menaechmus is the last to appear in Eudemos' *History of Geometry*, and information on Amphinomus, who is sometimes associated with Menaechmus in Geminus' passages, seem to reach Proclus via Geminus. Accordingly, it might be difficult to actually identify the ultimate source for the discussion. For Lasserre (1987: 614ff), Posidonius is the middle source between Philip of Opus and Geminus. Another option is to consider as the ultimate source Heraclides Ponticus, whose name is attested in Geminus' summary of Posidonius' *Metereologica* (Zhmud 2006: 185, n. 79), or a popular treatise on mathematics possibly written by Menaechmus (although Zhmud doubts he can be identified with the Academic Menaechmus).

⁴⁰⁸ See Plato, *Resp.*, 511d3-5.

fragment is transmitted and reaches Proclus, which is probably via Geminus through Posidonius, there is no reason to suspect Aristotelian nuances in the language given Geminus' (proximity to)⁴⁰⁹ and Posidonius' Stoicism.⁴¹⁰ Without wanting to deny a florid discussion and exchange between the Academy and the Lyceum nor the originality of Speusippus' thought, it is important to remember that Speusippus was the first head of the Academy after Plato, and his nephew. Moreover, despite his original solutions, his discussions testify to his particular concern related to fixing the problems of his master's theories, as well as accepting some of his frameworks.⁴¹¹ Therefore, it is more appropriate to suppose a Platonic echo and usage of the term, rather than an Aristotelian one. This supposition can be strengthened by the fact that also the metaphor of the hunt for knowledge, which has Platonic precedents,⁴¹² works in the same direction. Also, the metaphor of the hunt itself does not suggest an intuitive grasping. For however quick the hunt can be, a whole process for catching the animal is still required.

In light of this background, it would be quite curious to attribute to *διάνοια*, a discursive faculty of reasoning, the responsibility of the *apprehension* of simple and immediate principles.⁴¹³ Moreover, no extant fragment attributed to Speusippus even hints at the procedure of knowing the principles. As a matter of fact, none of the 'metaphysical fragments' mentions the question of our cognitive capacities: the possibility of knowledge related to the principles does not even occur as a topic. If an argument *e silentio* clearly cannot work as definitive, we can add that, on the contrary, all the 'epistemological

⁴⁰⁹ Although the extent to which Geminus can be considered a Stoic philosopher remains unclear. For hesitation about his attachment to Stoicism, see Zhmud (2006: 288-289, n. 5). By contrast, Kouromenos (1994) argues that Geminus' theories are consistent with Stoic tenets.

⁴¹⁰ Besides Aristotle's *Meteorology*, whose influence on Posidonius can be detected by his fragments, late sources attribute to Posidonius the use of *De Anima*, *De Caelo*, *De gen. et corr.*, as well as a work of Theophrastus entitled *On the genesis of the elements*. However, evidence for these books is slight (cf. Pajón Leyra 2013: 726) and, in general, Posidonius' interest for Plato as well as his commitment to appropriate Platonic philosophy incorporating it into his own system cannot be overestimated either (cf. Cooper 1999; Bonazzi 2007).

⁴¹¹ As, for instance, the way mathematical objects are conceived, embracing Plato's features for stable objects of knowledge.

⁴¹² Indeed, the metaphor recalls dialectical procedures in Plato's dialogues (*Phaed.* 66a; *Thaet.* 198a; *Polit.* 285d; *Soph.* 220b and 261a; *Phileb.* 65a). Cf. Dillon (2003), 84 n.121. Moreover, it is interesting is that the metaphor of the hunt occurs in another passage of the *Posterior Analytics*, and, specifically, in the context of book 2.13, where Aristotle speaks about definitions (*An.Po.* II 13, 96a20-23, 32-35) and has as a target the Platonic method of division. Indeed, the passage precedes the presentation of Speusippus' thesis for the necessity to know in what each thing differs from every other thing in order to define it (see section 4.1 footnotes 327-328). In this respect, if one takes the metaphor to be relevant, this would represent one more reason for shifting the focus of Proclus' fragment from an exclusively mathematical/geometrical context to a broader consideration of the objects.

⁴¹³ Bénatouïl-El Murr and Horky take the soul to be the agent. (See, esp. Horky 2018:35, n.21: 'It is worth noting, however, that Socrates in the Palinode (*Phdr.* 247c-d) does refer to the gods' observation of true being as involving 'thought' (*διάνοια*) which is steered by 'intellect' (*νοῦς ὁ κυβερνήτης*)). Although this identification may be fitting, however, information preserved by Aristotle on the soul are, as already highlighted, extremely scant and do not allow conclusive consideration of how the cognitive process is articulated by Speusippus.

fragments’, and those related to definitions, seem to share the common worry of *how* to know individual sensible objects. And this worry does not seem to be equally addressed to mathematical realities. With Aristotle’s words: ‘those who treat number as separable assume that it exists and is separable because the axioms *will not apply to sensible objects*; whereas the statements of mathematics are true and appeal (σαίνει) to the soul’.⁴¹⁴

If this does not yet provide us with a conclusive identification for τὰ μέν, at least it provides us with an upper limit for it. If διάνοια, as it seems, cannot refer to principles, and is not referred to principles in any other early *testimonia*, it would be more cautious to consider its first objects as being, to speak metaphorically, at a lower level than the principles. Granted that this provides us with a satisfactory ‘upper delimitation’ for the candidates for τὰ μέν, which as we excluded, cannot be the principles themselves, the fragment gives us elements to reasonably suppose a ‘lower limit’ for our identification as well:

- The fragment states that (lines 15-17), of the objects διάνοια hunts after, it (διάνοια) puts forward and prepares for the following inquiry τὰ μέν, without undertaking, or producing any kind of ποικίλην διέξοδον, that is, any kind of complex path.⁴¹⁵ Even though the immediate meaning might be taken to allude to an intuitive grasp of the objects in question, nevertheless, it is worth considering the sentence with attention to details. The first meaning of the adjective ποικίλος, many-coloured, has to do with colours. Indeed, the term ποικιλία is usually used both by Plato and Aristotle (but not only), with a direct reference to sensible and changeable objects.⁴¹⁶ Accordingly, what the passage is also suggesting, is that διάνοια, in grasping these τὰ μέν, does not need a process that go through sensible objects. It may be objected that, in Plato, the term tends to refer to the highest sensibles (i.e., stars, astronomical

⁴¹⁴ Fr. 80 IP₁ (=Arist., *Metaph.* N 1090a35-1090b2), transl. Tredennick.

⁴¹⁵ Note that Stenzel quotes Plato, *Politicus* 277b for a parallel use of διέξοδος with respect to the procedure of *diairesis*. *Contra*, Tarán (1980 and 2001) who, however, concludes his analysis of διέξοδος (2001: 585, n.69) by saying: ‘In short, the indirect knowledge referred to in the second part of F 73, need not be identified either with *diairesis* or with syllogistic inference, *though it may include both*’ (my emphasis).

⁴¹⁶ See, e.g. Plat., *Phaed.*, 110b4-110d5; *Resp.*, 7, 529d7–530a1; Arist., *HA*, 784 a 23-24. The usage of the term as ‘embroidery’ is also revealing. In the *Republic* both the noun and the adjective are used as a metaphor for representation (see, e.g. *Resp.* 557c: “There’s a good chance,” I said, “this will be the finest of the constitutions. Just like a cloak brightly embroidered with all kinds of flowers, so this state adorned with all kinds of characters would appear to be the finest. Perhaps too,” I said, “many would judge it to be so, just as children and women do when they see intricate embroideries (τὰ ποικίλα)”, transl. Emlyn-Jones; *Resp.* 401a-b “Again I imagine that painting and every craft of that kind is full of these qualities: weaving and embroidery (ἡ ποικιλία), house building and every trade concerned with household artifacts in general, and again the physical nature of animals and plants as well. For in all of these there is elegance or gracelessness. So too ugliness, poor rhythm and disharmony are close relatives of poor language and poor character, and *the opposites of each of these are closely related and imitate the opposite*, good sense and good character”, transl. Emlyn-Jones).

bodies).⁴¹⁷ In this respect, particularly relevant is *Resp.*, VII 529 d-e, where a comparison with sight is also provided. I report the text here:

“The following,” I said: “these stars that adorn (ποικίλματα) the heavens, since they ornament the visible sky (ἐν ὁρατῷ πεποικίλται), we think they’re the most beautiful and perfect examples of their kind (κάλλιστα καὶ ἀκριβέστατα τῶν τοιούτων). And yet they fall far short of the real ones—those courses, represented by real speed and real slowness in real number and in all the real geometrical shapes (ἐν τῷ ἀληθινῷ ἀριθμῷ καὶ πᾶσι τοῖς ἀληθέσι σχήμασι), which are conveyed in relation to each other and convey what is in them (πρὸς ἄλληλα φέρεται καὶ τὰ ἐνόντα φέρει), all of which can be apprehended **by reason and intellect**, but not **by sight** (λόγῳ μὲν καὶ διανοίᾳ ληπτά, ὄψει δ’ οὐ). Or do you have another view?” “Not at all,” he said.

“It therefore follows,” I said, “that we must use the splendor of the heavens as models for the purposes of our study regarding those other things (τὸν οὐρανὸν **ποικιλία** παραδείγμασι χρηστέον τῆς πρὸς ἐκεῖνα μαθήσεως ἕνεκα), just as if one might resort to figures elaborately drawn in various ways (διαφερόντως γεγραμμένοις καὶ ἐκπεπονημένοις διαγράμμασιν) by Daedalus, or some other craftsman or artist. I imagine that anyone experienced in such matters (τις ἔμπειρος γεωμετρίας) would regard them as excellently executed, and yet it would be absurd to consider them seriously in order to apprehend within them the truth about equal, double, or any other proportion (γελοῖον μὲν ἐπισκοπεῖν αὐτὰ σπουδῇ ὡς τὴν ἀλήθειαν ἐν αὐτοῖς ληψόμενον ἴσων ἢ διπλασίων ἢ ἄλλης τινὸς συμμετρίας).”

Even in this passage, where Plato presents the study of the stars and the (visible) heaven as for the sake of understanding other kinds of objects, those objects which cannot be understood by sight, but are to be understood by reason and thought (λόγος and διάνοια) and are indeed *mathematical and geometrical objects*. Just as a geometer makes use of diagrams and images, the same usage should be reserved to the heavens. The comparison is once more played by a contrast between sensible objects (although the most perfect examples of their kind) and objects which should be grasped by διάνοια and are *not immediately intuitive* (especially since the use of diagrams or the observation of the sky is advised). As the usage of the adjective, even in the *Republic*,⁴¹⁸ is not limited to the most perfect kind of the sensibles only, I believe this gives us a lower limit for our candidates. We established that διάνοια cannot address principles; from this it seems that it does not address sensibles either.

- In addition, the following metaphor stresses the same point. The fragment states (lines 18-19) that διάνοια has with τὰ μὲν ‘a clearer (ἐναργεστέραν)⁴¹⁹ contact

⁴¹⁷ Although the usage of the adjective is not limited to them only. See the next footnote.

⁴¹⁸ Both with the meaning of ‘colorful’ (e.g. *Resp.* 8, 557c, τὸ ἰμάτιον; 8, 558c, ἡ πολιτεία; 8, 561e, ὁ ἀνὴρ) and with the meaning of ‘varied’ (e.g. *Resp.* 589d (αἱ ἡδοναί); 10, 604d, ἡ μίμεις), if the two can be distinguished meaningfully.

⁴¹⁹ With respect to the adjective, Isnardi Parente (2005: *Commento* (a): 3, F2) comments: ‘Speusippo aggiunge l’aggettivo ἐναργής, non ignoto a Platone seppur usato raramente (cfr. ad es. *Resp* 511a 8) e non mai, come

than sight has with visible objects'. Once again, although the immediate reading of the text implies a direct contact between *διάνοια* and *τὰ μὲν*, the metaphor can be also read differently. Indeed, although the metaphor can be taken as referring back to book VII of the *Republic*, where the sight and the light of the sun offer a comparison for the intellect (*νοῦς*) and the the Form of Good, what makes it striking is precisely the word *ἐπαφή*, contact. The word does not recur very often in the Platonic corpus, as it occurs only 5 times and always with a clear sense-perceptive reference.⁴²⁰ Accordingly, if we take sight to be the clearest of the senses, *διάνοια* allows a comprehension that is superior to the senses themselves.⁴²¹ Therefore, the metaphor exploits a comparison with sight, but goes beyond the metaphor to stress once more the superiority of thought over the senses in relation to these objects.⁴²²

Although this conclusion might sound intuitive, the references strengthen the conviction that the lower limit for our inquiry of *τὰ μὲν* excludes sensible objects from our candidates.

qui, *con ἐπαφή*'. But the importance acknowledged by Geminus to *ἐνάργεια* in his interpretation of Euclid's postulates 1-3 (Procl., *In Eucl.* 186,5 Friedlein) should at least cast doubts on the usage of the adjective by Speusippus, in particular given that those postulates (i.e. the construction of a line, and that of a circle) are used as examples for the first kind of knowledge. Moreover, the Stoic justification of the *ἐνάργεια* of Euclid's postulates and the Stoic definition of straight line rely precisely on the notion of uniform flow or motion. (On this, see Kouremenos 1994: 443ff especially). The same comment may perhaps be extended to another term occurring in the lines preceeding the fragment, i.e. the adj. *αὐτόπιστος* (self-evident). Dillon (2003: 84, n. 120) notes it is 'of doubtfully classical provenance, being attested no earlier than Hero of Alexandria (2nd cent. BC)'. And Kouremenos (1994: 446) in his analysis establishes a coextensiveness between the notions of *οὐκ ἀναγκαῖον* and *πιθανόν* on the basis of Procl., *In Eucl.*, 192, 13-17). In this respect, *αὐτόπιστος* might be possibly paired with *ἐνάργεια*, as characterising the epistemic assent required from postulates. Accordingly, this gives us another reason to reject a) the authenticity of the examples and, most of all b) the attribution of the examples to Speusippus on the basis of the theory of the flow (Cherniss 1945: 396-7 n. 322.).

⁴²⁰ Stenzel refers to similar metaphorical usages of the verb *ἐφάπτεσθαι* in Plato (*Phaed.* 79 d and *Symp.* 212 a). For this reason, Tarán (1981: 431) concludes that 'if Speusippus had the word, this passage would be the first attestation of its metaphorical use to designate mental 'apprehension''. However, the context where the word itself appears, besides their striking relevance, seems to show the opposite. See, *Crat.* 404d: 'Pherepapha, or something of that sort, would therefore be the correct name of the goddess, because she is wise and *touches that which is in motion* (*ἐπαφή τοῦ φερομένου*)', transl. Fowler; the same justification for *σοφία* can be found at 412c; *Theaet.* 186b, where Socrates and Theaetetus are discussing about sensations. Socrates asks: 'Does it not *perceive* (viz. the soul) the hardness of the hard through touch (*ἐπαφή*), and likewise the softness of the soft?' Theaetetus agrees and Socrates concludes: 'But their essential nature and the fact that they exist, and their opposition to one another, and, in turn, the essential nature of this opposition, the soul itself tries to determine for us by reverting to them and comparing them with one another', transl. Fowler. In the *Sophist* (246a) the word occurs in the discussion of the battle *περὶ τῆς οὐσίας* between the giants and the gods. The giants drag everything from heaven to earth and maintain that only '*ὁ παρέχει προσβολὴν καὶ ἐπαφὴν τινα*' exists. The last occurrence, in the *Timaeus* (46b) is possibly the most relevant. Indeed, the word occurs in the explanation of vision, and, in particular, in the explanation of how reflection in the mirror works. If this parallel is, at all, relevant, it would provide another reason in favour of the identification of *τὰ μὲν* with mathematical objects in view of the acknowledgment, or mirror reflection, the soul has of them. See, *infra*, pp. 99-100 on Crubellier's comment about the verb *σαίνω*, and n. 431.

⁴²¹ The metaphor as well recalls the metaphor of sight, exploited by Plato in the *Republic* (516b-517c).

⁴²² Bénatouil and El Murr (2010: 60) also stress this point: 'À propos des premiers objets, Speusippe ne décrit pas vraiment une connaissance intuitive: il insiste sur leur évidence par rapport aux sensibles et le fait qu'ils sont avancés et saisis par l'âme sans justification élaborée'.

At this juncture, our candidate for τὰ μὲν needs to be something (1.) of which secure knowledge is granted; (2.) which is not identified with sensible objects; (3.) which allows a clearer comprehension than sight has to visual objects but (4.) does not correspond to the principles themselves.

Given these premises, I believe that the best and most suitable candidate for τὰ μὲν are thus τὰ μαθηματικά: mathematical objects. As a matter of fact, this identification would square with Speusippus' ontology as presented by Aristotle, in which, as underlined, mathematical objects are described as 'the first of beings and separate from sensible things'.⁴²³ As we have seen, although testimonies are not consistent in presenting the same object in their reports, which can be numbers, mathematical objects and, sometimes, even mathematical propositions,⁴²⁴ what is usually consistent in Aristotle's reports of Speusippus is the insistence in considering mathematical objects as the first ὄντα, the first of beings, and a 'καθ' αὐτὴν φύσιν',⁴²⁵ a reality by itself. In addition, we have shown how this picture can be complemented by the passage of Proclus' *In Euclidem*,⁴²⁶ where Speusippus is described as being so committed to the view that objects of theoretical science do not admit any kind of γένεσις, to refuse that they could be called 'problems'; thus, according to the evidence preserved, Speusippus' account of mathematical objects is pictured as follows: mathematical objects exist in the full sense as eternal, immutable, ungenerated ὄντα.

If this is right, what does it mean that διάνοια puts τὰ μαθηματικά forward and prepares them for the following inquiry? Although the objects of mathematics are eternal, ungenerated and immutable, Speusippus, in order to guarantee the possibility of mathematical and geometrical practices, must have allowed some form of interaction and manipulation of them. This seems to be confirmed by [FR. 36], where Speusippus speaks about generations (γενέσεις) that we see as appearing in the domain of theoretical objects (Procl., *In Eucl.*, 77,15–78,8 Freidlein). By 'taking eternal things as if they were in the process of coming to be' mathematical and geometrical operations are safe, and so is their eternal status. Bénatouil and El Murr offer an interesting perspective on the status of geometrical knowledge and its closeness with dialectic. Accordingly, in the passage Speusippus would be emphasising the closeness that geometry and dialectic obtain, by appealing to the processes of geometrical

⁴²³ Arist., *Metaph.* M 1080b14-16, transl. Tredennick slightly modified.

⁴²⁴ At least apparently. This is especially true for Proclus' testimony, in which, as already emphasised, the objects addressed by Speusippus' theories usually appear as neuter plurals; accordingly, the referent for such objects often needs to be understood from Proclus' context. See, e.g. Procl., *In Eucl.*, 179 Friedlein, 8-24.

⁴²⁵ Arist., *Metaph.* N 1090a4.

⁴²⁶ Tarán's fr. 36 (Arist. *Metaph.* N 1090a2-b5) and 41 (Arist., *Metaph.* N 1091a12-24), not accepted as genuine fragments by Isnardi Parente.

demonstration (exemplified by the hunt of τὰ μὲν) and construction (exemplified by the hunt of τὰ δέ). According to their interpretation, the objects διάνοια puts forward and prepares for the following enquiry are indeed to be identified with hypotheses. I think the identification must be right and I believe it is particularly fruitful especially because it does justice to a process of manipulation of mathematical and geometrical objects which Speusippus, as noted, must have allowed (however, they acknowledge such a similarity as belonging to the second practice).⁴²⁷ They state:

‘L’idée que l’âme «propose» ces objets sans explication et les «prépare» au début et en vue d’une recherche suggère que Speusippe songe à des points de départ simples posés par l’âme, donc sans doute à des «hypotheses», par lesquelles on se donne les objets que l’on veut examiner en les décrivant et en posant leur existence, comme en *Resp.* 510c-d, où l’on retrouve l’absence de justification des hypothèses (οὐδένα λόγον), leur évidence (ὥς παντὶ φανερωῶν) et leur lien avec le but visé par la recherche (καθ’ ἐκάστην μέθοδον et ἐπὶ σκέψιν ὁρμήωσιν)’.⁴²⁸

The example is useful, as it provides an explanation for a process of knowledge of eternal beings, by stating what it means to employ mathematical objects and understand them ‘as if’ they were coming to be. However, there are details of this analysis I disagree with. Indeed, Bénatouïl and El Murr argue that there is no direct and intuitive apprehension of such objects.⁴²⁹ Although, as I also emphasised, it is true that Speusippus: ‘insiste sur leur évidence par rapport aux sensibles et le fait qu’ils sont avancés et saisis par l’âme sans justification élaborée’,⁴³⁰ knowledge of mathematical objects is described *also* by Aristotle as some sort of intuitive *acknowledgment* at least. For, as Aristotle says, ‘the statements of mathematics are true and appeal (σαίνει) to the soul’.⁴³¹ The verb, analysed by Crubellier in

⁴²⁷ ‘Ce second type de «recherche» pourrait être inclus dans la description de Speusippe, puisque κατὰ μετὰ βασιιν pourrait aussi désigner la nécessité où nous sommes d’analyser certains objets simples et éternels comme s’ils étaient engendrés ou composés. On notera en outre que Platon précise qu’une fois atteint «le principe du tout», en pregnant son «élan» depuis des hypothèses, le discours dialectique «s’attache (ἀνυμένος) à celui-ci et, inversement, suit ce qui suit de celui-ci (ἐχόμενος τῶν ἐκείνης ἐχομένων)», (*Resp.* 511b7, cf. *Phaed.* 101d5), ce qui ressemble à la connaissance «d’après ce qui en découle» dont parle Speusippe pour les seconds objets’, Bénatouïl and El Murr (2010: 61-62).

⁴²⁸ *Ead.* (2010: 60).

⁴²⁹ However, Bénatouïl and El Murr (2010: 59) translate the second part of the passage as follows: ‘alors qu’elle ne peut saisir *directement* les autres et marche vers elles par inférence et essaye d’entreprendre leur chasse d’après ce qui suit d’elles’. By saying that διάνοια cannot grasp τὰ δέ directly, the implication seems to me that, on the contrary, it was indeed able to grasp τὰ μὲν this way.

⁴³⁰ Bénatouïl and El Murr (2010: 60).

⁴³¹ Fr. 80 IP1 = Arist., *Metaph.* N 1090a35-1090b2, transl. Tredennick. In his commentary, Crubellier (1994: 486-487) provides an analysis of the verb, which is quite unusual in Aristotle’s prose. For Crubellier, the verb: ‘précise de quel genre de vérité il s’agit en en produisant le critère, à savoir le sentiment intérieur de la nécessité de ces propositions (my emphasis). C’est un critère de vérité indépendant de l’expérience; celui-là même auquel l’esclave du Ménon se réfère pour donner ou refuser son approbation à Socrate’. Indeed, the verb in its most direct sense is used to describe the well-known behavior of the dog when he recognizes his owner, describable as a: ‘cérémonial d’apaisement ou de reconnaissance’. The same meaning is preserved in the more figurative usage of the verb. To quote Crubellier: ‘C’est en ce sens qu’Aristote emploie ici σαίνειν. Le paradoxe est que la reconnaissance soit en quelque sorte décrite objectivement, parce qu’elle est fondée sur un signe qui

his commentary of books M and N of the *Metaphysics*, describes a ‘reconnaissance des vérités a priori (...) de façon immédiate et quasi affective’. Despite minor disagreements, I nonetheless take our interpretations on this section to be compatible. For the procedures of mathematics might indeed require processes of manipulation of these eternal entities (to be sure, such objects are not manipulated *for real*, but we perceive the process *as if* they were actually modifying),⁴³² but once the demonstrations/operations are done, we intuitively acknowledge those objects which, to put it anachronistically, call for our assent and acknowledgement.

At this point, we can finally turn to the analysis of the second part of the fragment and try to find a candidate for τὰ δέ as well.

4.2.3 The identification of τὰ δέ (lines 19-22)

In contrast to what is said with respect to mathematical objects, δίανοια is unable to grasp τὰ δέ directly. Of course, the correlation τὰ μέν - τὰ δέ requires these objects to be different from the previous ones. To test the results just obtained, we might well ask if mathematical objects are at stake here and must be identified with τὰ δέ rather than with τὰ μέν.

Accordingly, since δίανοια was able to wholly grasp τὰ μέν directly and without any complicated path, it is clear that the difficulty experienced by δίανοια at this level cannot concern δίανοια itself but is, conversely, directly attributable to *these objects*. However, as we mentioned above, if these objects are hard to grasp, they cannot correspond to τὰ μαθηματικά, as their ontological status requires from them to be stable, eternal and immutable, and as they greet the soul. For I believe the difficulty here experienced by δίανοια is to account for a *strong* ontological difference of τὰ μέν with respect to τὰ δέ. Given the assumption that the first process (viz. that of τὰ μέν) accounts for a manipulation of mathematical objects more broadly (whether demonstrative or constructive it may be) it would not make sense to identify τὰ δέ with mathematical objects as well. In the end, the discussion between Speusippus and Menaechmus granted that the designation ‘theorem’ was the most appropriate *whatever* the process described may have been, i.e. either constructive or demonstrative (πάντα). In that context [FR. 36], it is the ontological status *of mathematical objects* which plays a strong role in the determination for the appellative, and not that *of the processes described* for reaching those eternal. The same consideration, I believe, can be extended to the objects in question in [FR. 35]. Accordingly, as I believe the

vient de l’objet lui-même, et ne résulte pas d’une activité propre du sujet connaissant. L’argument veut donc souligner que cette reconnaissance des vérités a priori se fait de façon immédiate et quasi affective’.

⁴³² *Contra*, see Isnardi Parente (1974: 919), who affirms that Speusippus did not admit constructive and operative processes in mathematics. But this cannot be the case.

ontological distinction between τὰ μὲν and τὰ δέ needs to be applied more radically, the most suitable candidates for the identification of τὰ δέ remain, indeed, sensible objects. But what does διάνοια do when it hunts after sensible objects?

In order to answer this question, two ambiguities need to be ruled out first. Indeed, most of the translations of τὸ ἀκόλουθον either (i) connect the term to a formal or logical consequence of τὰ δέ or (ii) establish an ontological dependence of τὰ δέ on τὰ μὲν. Both interpretations involve problems once the process of knowledge is analysed in more detail: on the one hand, to consider the hunt of τὰ δέ as associated to their (sc. of τὰ δέ) logical/formal *consequences* produces a third kind of objects which is easily grasped by διάνοια (and the risk of a vicious understanding of these latter by means of their consequences); on the other hand, to establish the ontological dependence of τὰ δέ on τὰ μὲν diminishes drastically the ontological difference established between the two kinds of object.

For the sake of clarity, I have chosen two sample translations here, which convey the two different meanings. Although both translations work, grammatically speaking, I believe the nuances they have can be misleading in trying to understand the meaning of the passage.

- a. The first is provided by Guthrie, who translates the second sentence: ‘Others it cannot seize upon immediately, but progresses towards them by inference and endeavours to track them (sc. τὰ δέ) down *by way of their consequences*’ with a logical meaning, strengthened by the term ‘inference’ as well.⁴³³

If we take the logical nuance at work (i.e. the ‘consequences of τὰ δέ’), we have a third kind of object involved: the consequences of τὰ δέ. But this is at least puzzling. Indeed, according to this interpretation, διάνοια would be able to grasp directly not only τὰ μὲν, but also the consequences of τὰ δέ, by mean of which, by inference, would be able to finally hunt τὰ δέ (or at least this is how I take the translation to work). Besides involving a third kind of objects that would be immediately grasped, the interpretation is also potentially vicious. Indeed, without any clear identification for τὰ δέ, it is quite hard to establish what those

⁴³³ Guthrie (1978: 467). It must be said that it was not Guthrie’s intention to provide a precise translation of the passage. However, his translation offers an example to show what interpretative problems such interpretations may imply. Timpanaro Cardini (1978:155) goes in the same direction by translating: ‘mentre altre, incapace di afferrarle di colpo, oltrepassandole per gradi cerca di perseguitarle attraverso *le loro conseguenze*’ (my emphasis). Also Bénatouïl and El Murr opt for ‘par inférence’. However, if I understand their translation correctly, by translating κατὰ τὸ ἀκόλουθον with: ‘ce qui suit d’elles’, they consider such consequences as those that follow *from* them (viz. τὰ δέ), and not (after) *them*. I take this difference to be crucial. For, this way, it is the complexity of the objects themselves, which is in question, and not the implication of a third kind of objects (i.e. one needs to approach by inference the difficulties arising *out of* them, and not their logical consequences).

consequences are. Are those objects, i.e. the consequences, different from τὰ δέ themselves? And in what respect? Because if they are, but they do pertain to the same ontological domain of τὰ δέ, their intelligibility as well would need to rely on their consequences and so on.

- b. The second is the most recent translation of the passage, by Horky,⁴³⁴ who translates: ‘others it [sc. thought], because it is unable to grasp them immediately, attempts to hunt after by advancing on them step-by-step according to what follows after these [sc. the principles]’, with a positional/ontological nuance. In this case, the two practices are somehow independent and determined by the kind of objects δίανοια hunts after. Hence, if one is hunting after τὰ μὲν (viz. simple mathematical objects), such objects are apprehended easily and, accordingly, only require basic epistemic operations. By contrast, if one is attempting the hunt of τὰ δέ (viz. complex mathematical objects, of which τὰ μὲν are principles), multiple steps will be required, and the research will involve the use of τὰ μὲν for their hunt.

However, I believe the ontological dependence of τὰ δέ on τὰ μὲν to be problematic. Besides the fact that, as we have seen, there is no indication at all, if we exclude Proclus’ lines preceding the fragment, that principles are at stake here nor that τὰ δέ can be constructed or proved by means τὰ μὲν —and also, to connect αὐτῶν with τὰ μὲν grammatically is a stretch — to establish ontological dependence between the two objects means to diminish their ontological difference, and, consequently, the reasons for δίανοια’s capacity or incapacity to grasp objects easily. The difference between the two kinds of objects would indeed be reduced to the number of steps required for their demonstration. But how are we to consider the steps themselves? How can we justify the simplicity or complexity of the objects in question? By phrasing it with the soritis paradox, when are objects so complicated to require a step-to-step approach, and when, instead, can they be considered simple? In this respect, the ontological distinction grounding the δίανοια’s easiness or difficulty in grasping the objects almost vanishes. Indeed, mathematical procedures that have already been proven should probably be considered as simple and immediate (as well as logically prior and principles of) with respect to more complex ones. For, otherwise, δίανοια would not be able to grasp them as well. Besides fitting suspiciously Proclus’ own conception of theorems and problems and Euclid’s own use of proven theorems and problems,⁴³⁵ I believe the outcome

⁴³⁴ Horky (2018: 33).

⁴³⁵ See, Procl., *In Eucl.*, 81.

of such an interpretation to be a completely deductivistic interpretation of mathematics, which I am not ready to accept.⁴³⁶

To wrap things up, I believe that an interpretation that opts either for a logical or an exclusively geometrical/mathematical grounding of the fragment is misleading.⁴³⁷ Indeed, what I think is here at stake is something like the implications or, better, the inter-relation of such τὰ δέ that is, of the sensibles. In this sense, τὸ ἀκόλουθον represents the reciprocal congruency that sensible objects entertain when one investigates them. If this reference may not appear immediately legitimate, we may recall that instead, the sentence ‘<περὶ> ἀναλογίας τε καὶ ἀντακολουθίας’, preserved in ps-Iamblichus’ resumé of Speusippus’ book, offered most of the ground for scholars to suppose the existence of a connection between Speusippus’ levels.⁴³⁸ Why not, then, accept the same framework here?

If we think about the sensibles, and about how Speusippus’ conducted his own inquiry into sensible objects, we find him occupied with a taxonomic arrangement of reality, investigating sensible objects by understanding the common properties that they hold.⁴³⁹ To investigate the sensibles means to know in what respect items are similar to one another, and, therefore, to know their reciprocal relationship. This horizontality of the research is continuously implied in the description of the second operation performed by διάνοια, which features references both to a horizontal movement acrosses the objects (διὰ) and to a connection between more objects (μετά). The movement of μετάβασις,⁴⁴⁰ for instance,

⁴³⁶ Especially if we accept the identification of the One and Plurality as principles of numbers. Indeed, mathematics (and/or) geometry, if completely deducible, should probably be ultimately reduced to their first principles. However, the interpretation could possibly be defended by appeal to the testimony of a certain Diodore (Fr. 2 IP1= D.L., IV, 2), according to whom Speusippus was the first to consider what is common in ἐν τοῖς μαθήμασιν, and, possibly, by establishing that principles here have a less connoted meaning.

⁴³⁷ In this respect, however, I believe that the construction of El Murr and Bénatouil’s translation of the passage is congruent with mine and differs only for a choice of the terms translated. For the sake of completeness, I report here their translation: ‘Il faut en effet dans tous les cas que les principes diffèrent de ce qui vient après les principes par leur simplicité, leur indémonstrabilité, leur fiabilité intrinsèque. En effet, dit Speusippe, en général, des choses dont la pensée entreprend la chasse, elle propose les unes sans produire d’explication compliquée et les prépare pour la recherche prévue, et a avec elles un contact plus clair que la vue avec le visible, alors qu’elle ne peut saisir directement les autres et *marque vers elles* par inférence et essaye d’entreprendre leur chasse d’après ce qui suit d’elles’, El Murr and Bénatouil (2010: 59).

⁴³⁸ See, Tannery (1887: 285) who emends ἀντακολουθίας with ἀνακολουθία; Isnardi Parente (2005, *Commento* (2): 15); Tarán (1981: 267-268) who rejects the Stoic meaning of ‘reciprocal implication’ (*SVF* II, p.121,7; III, p.67,44-45) on the basis of a supposed asymmetry of the relation, but accepts that of ‘correspondence’. Note also that ἀντακολουθίας will become the technical term for the *mutual involvement* of virtues.

⁴³⁹ See, *infra*, section 4.1.

⁴⁴⁰ For parallel usage of κατὰ μετάβασις with a sense progression, or transition, rather than as a procedure of analogy or transposition (as, e.g. in Sextus, esp. with the verb νοέω *Adv. Math.*, I, 25; III,40-44; 109-110), see, e.g. Nicomachus (*Harmonicum enchiridion* 7.16-18) also quoted by Iamblichus (*VP*, 120. 17-18): ‘and the semitone moved from the first to the middle to the third place’ (τοῦ ἡμιτονίου κατὰ μετάβασιν τὴν τε πρώτην καὶ τὴν μέσην καὶ τὴν τρίτην χώραν μεταλαμβάνοντος, transl. Clark); Nemesius (*De Natura Hominis* VII): ‘Le mouvement ayant lieu par succession, il y en a une partie qui se fait d’abord, et une autre qui se fait ensuite’ (καὶ ἡ κίνησις δὲ κατὰ μετάβασιν γινομένη τὸ μὲν ἔχει πρότερον, τὸ δὲ δεύτερον, transl. Thibault). From a brief overview of the parallels, it looks like the meaning of transition is more common with verbs of movement,

neither implies a vertical nor a descending movement, but only a horizontal one, suggested by the verb διαβαίνω as well. In this respect, the verb διαβαίνω also metaphorically evokes the process of analysis required in order for these objects to be grasped. Thought goes across them and understands them by means of the properties these objects have in common. If this is right, we can picture διάνοια in the effort of analysing the objects of the sensible realm, enquiring them by analysing their reciprocal relation and congruency. This second procedure is not at all immediate for it requires the effort of a mediated collective analysis.

4.2.4 The significance of the fragment within Speusippus' epistemology

If my analysis is right, the fragment presents two different kinds of operations performed by διάνοια and addressed to two different kinds of objects. On the one hand, a process culminating in a direct form of acknowledgment that, as I suggested, addresses the domain of mathematical objects. On the other hand, a collective and mediated kind of knowledge which addresses sensible objects, takes into account more objects at the same time and investigates them by means of their *reciprocal relations*. In the end, the fact that sensibles represent the counterpart of the direct grasp is hinted even from the first part of the fragment, since both the connotation of directness and immediateness *and* the metaphor of sight explain the hunt for τὰ μέν in a comparison with sensible objects. If this reading is right, my interpretation would allow an understanding of the passage that works independently from Proclus' reading and gives back to Speusippus an original epistemological theory which is coherent with the evidence preserved by Aristotle both with reference to the mathematical level and to the sensible realm. Indeed, the passage would give a rationale for the pursuit of the ὅμοια, a horizontal process which addresses more than one object at a time and connects them by means of what is similar. Moreover, this interpretation would give a more explicit indication of the direction of the movements, suggested by the two prepositions διά and μετά, which is absent in previous translations.

Lastly, and more importantly, the process of understanding mathematical and geometrical objects, considered by Speusippus eternal and immutable, and that of understanding sensibles, probably not stable by definition, is rendered independent. On the one hand, without denying the processes of manipulation required to reach them, we find a final and stable grasp of objects that, by nature, cannot allow modification or change; on the other hand, we find a collective inquiry that is able to take into account more than one object at the same time, and enables their understanding through the comprehension of their mutual similarities. This way, the fragment confirms the possibility of both inquiries, and the

while that of analogy with verbs of knowledge. Accordingly, I take the verb διαβαίνω to be decisive in view of determining the meaning of κατὰ μετάβασιν.

preservation of the internal economy at each level. As confirmed by the analysis in section 4.1., sensibles do not need a superimposed level in order to be understood and arranged taxonomically: their knowledge may be more complicated and indirect, but their inquiry is nonetheless safeguarded. Moreover, in this way Speusippus reveals at the same time his Platonic inheritance and his own original contribution: he preserves the Platonic features related to real objects of knowledge by stating that mathematical objects are separated and, subsequently, eternal and immutable, but finds in the separation of the two levels the possibility of securing a method of enquiry into and understanding of the world.

CHAPTER FIVE: THE PRINCIPLES

Now that we have provided an outline of how the different levels of Speusippus' system are arranged, and how they stand in relation to one another, we finally get to the thorniest question, which relates to the principles, and, more specifically, primary principles.

In the previous chapters, we have often witnessed Aristotle discussing Speusippus' first principles in different contexts and providing information about the relation they entertain with what they are said to be principles of: mathematical number. Accordingly, aim of this chapter will be to analyse the information obtained from the previous analyses in the attempt to harmonise them into a consistent, or at least consonant, narrative. For obvious reasons, this chapter will present the most tentative conclusions on Speusippus. Indeed, as emphasised in the previous chapters Aristotle's material (especially with regard to first principles) is very difficult to disentangle. The reasons for this difficulty are many: the information is sometimes biased (see, e.g., Chapter 2, 'The absence of good in the principles'); sometimes Aristotle addresses the Platonists as a group rendering difficult the various differentiations (see, e.g., Chapter 3, 'Mathematical number'); the identification of principles other than the primary is often difficult because of the absence of sufficient material (see, e.g. Chapter 4, 'The sensibles') therefore preventing the possibility to deduce information on the basis of other kind of principles. However, an account of Speusippus' philosophy would not be complete if it did not explain its most puzzling aspect: the account of first principles. Thus, the following sections will attempt to find the most coherent explanation for the information collected up to this point.

5.1 Methodological clarifications: gathering information about first principles

In order to provide a coherent account, I shall first clarify some methodological assumptions which I will employ in gathering information about principles.

First of all, I do not consider legitimate any gathering of information about first principles on the basis of an analogy with other sorts of principles. The reason for this is that in Aristotelian passages about Speusippus principles other than those that are

primary are never described clearly. A clear example is provided by geometrical magnitudes: Aristotle usually hints at a unified conception of the mathematical realm, and thus at a unified conception of mathematical and geometrical objects. Inasmuch as magnitudes are arranged separately from numbers in Aristotle's list of Speusippus' οὐσίαι in Z2⁴⁴¹ and inasmuch as a unitarian conception does not imply necessarily the absence of specific principles for numbers and geometrical magnitudes respectively,⁴⁴² no other passage in Aristotle allows us an identification of what the principles of geometrical objects are to be identified with *precisely*. For instance, the only passage which would shed light on the issue, and on which scholars⁴⁴³ have relied on, does not specify what the second principle of magnitudes should be. Indeed, the passage states that:

these thinkers, then, generate (γεννῶσιν) geometrical magnitudes from this sort of material principle, but others generate them from the point (they regard the point not as a one but as similar to the one) and another material principle which is not plurality but is similar to it.⁴⁴⁴

The second principle is usually identified with διάστημα, mentioned by Aristotle a few lines afterwards (b 30-33). However, as Crubellier highlights in his commentary,⁴⁴⁵ there is no compelling reason to take the term to be Platonic instead of properly Aristotelian. Moreover, he notes that Aristotle's reticence in naming the second principle is striking. Indeed, even in the lines following the extract just quoted, Aristotle insists precisely on the absence of a clear differentiation of the second principle (πληθος) in order to draw the following contradictions.⁴⁴⁶ Lastly, one may note that, in absence of further evidence, the distinction between a material and formal principle may not necessarily be applicable to Speusippus, and could be instead reminiscent of Aristotelian

⁴⁴¹ See Chapter 1, section 1.1.

⁴⁴² I do not take this to be the case. What I want to stress with 'unitarian conception' is only that geometrical magnitudes, although being usually referred to as having different principles than mathematical number, share the same *ontological status* of the latter insofar as both are eternal and not liable to change. This aspect, however, may constitute an argument against the supposition that analogical relationship between principles hold good in the system in absolute. Indeed, a unitarian conception of the mathematical realm might suggest that principles of geometrical magnitudes work analogically with respect to primary principles (those of numbers) but might also imply that this does not hold good for any principles (e.g. those of the soul).

⁴⁴³ See, e.g. IP₂ (2005: 39), Dillon (2003: 45).

⁴⁴⁴ Arist., *Metaph.* M9 1085a31-34, Transl. Tredennick (241) slightly modified.

⁴⁴⁵ Crubellier (1994: 345). The term διάστημα, however, occurs also in fr. 122 IP (ps-Iamblichus' *Theolog. Arithm.*).

⁴⁴⁶ Arist., *Metaph.*, M9, 1085 b1ff: 'for, if the matter is one, line, plane and solid will be the same; because the product of the same elements must be one and the same. if on the other hand, there is more than one kind of matter -one of the line, another of the plane, and another of the solid- either the kinds are associated with each other or they are not', transl Tredennick. Note here that there is no further reference to points, although Aristotle, in other arguments (see, e.g. in M3) does decompose lines into points. In ps-Iamblichus' quotation (fr. 122 IP₁), the principles appear to be four: the point, the line, the triangle and the pyramid.

hylomorphism.⁴⁴⁷ Given this premises, it would be incautious to assume features of principles other than primary in order to deduce on this basis characteristics for the latter. And the same holds good for principles of the soul (of which Aristotle makes no mention at all) and for principles of sensible objects.⁴⁴⁸

Secondly, I will take all the information gathered to be valid for *both* primary principles, even for passages in which only one principle is explicitly addressed, and I will assume the data to expose the *functioning* of principles. This is for the following reasons. First, as already shown in Chapter, I take Speusippus' principles to be unqualified, save for their quantitative aspect. As argued in section 2.7, I believe participation was a crucial problem for Speusippus, who, in order to avoid the necessity of ontological grounding of the objects populating his world and to differentiate epistemological practices, decided to characterise his system as episodic. Moreover, the same problem seems to be echoed in Aristotle's passages about mathematical number, and specifically in those addressing its relationship with the One: a connected problem to characterising the One as good would result in the production of many good units, and in an abundance of good(s) in the world. For this reason, I will take Aristotle's suggestions about the principles (e.g., the claim that the One becomes 'not even a thing';⁴⁴⁹ the claim that the second principle is 'universally predicated'⁴⁵⁰) to work more as information about the functioning of the principles insofar as they are principles, rather than as a characterisation of individual primary principles respectively. In this respect, I believe it is more natural to assume that the two primary principles work in one and the same way and, accordingly, that their features are, so to say, co-extensional, rather than understanding those features as differentiating the two.

Lastly, as a clarification, I will take primary principles to be the principles of mathematical number *only* and not to be at work at more general levels. With this, I do not want to deny that the 'geometrical level' might have similar sort of principles, since this seems to be implied by Aristotle, nor do I want to conclude that we should understand primary principles as necessarily ruling over the whole mathematical

⁴⁴⁷ *Contra*, see Dillon (1990a). Dillon, however, establishes as a premise that what he will say about Speusippus' female principle will be particularly true 'if we are prepared [...] to accept as essentially Speusippean ch. 4 of Iamblichus' *De Communi Mathematica Scientia*' (1990a: 13).

⁴⁴⁸ Isnardi Parente identifies these principles with ταῦτόν and θάτερον, and so does Bechtel (2010: 40-41) on the basis of (mainly) Arist., *Metaph.* 1004a1-10, but the passages he refers to are not included in Isnardi Parente's collections of the fragments (IP₁ and IP₂) nor in Tarán's.

⁴⁴⁹ See, Chapter 2.

⁴⁵⁰ See section 3.2.

realm.⁴⁵¹ Simply, since the relationship between primary principles and mathematical number is the only one which is well attested in Aristotle's corpus, it is better to address this relation only, before verifying whether it can be extended in any analogical way. Moreover, I will take the primary principles to be at work necessarily as a pair, to be opposed to one another,⁴⁵² and to have the same status, except for their quantitative characterisation.

Accordingly, we can now turn to the data obtained so far.

- a) In section 1.1, when analysing the list of οὐσίαι of Speusippus provided by Aristotle, I observed a difficulty in determining whether Aristotle is treating the One as included in the list or as excluded. I concluded that one option to resolve the ambiguity might have been to consider primary principles as having an ontological status that sounded ambiguous to Aristotle. If this is the case, the One and Plurality may retain a peculiar ontological status, which is difficult for Aristotle to define clearly. Indeed, the difficulty results also from the fact that mathematical numbers are often presented by Aristotle as the first ὅντα in Speusippus' system.
- b) In section 2.3, in the context of Aristotle's criticism of Speusippus' principles, I took the claim that 'principles are causes' as genuine. In particular, I argued that such a claim had a specific designatum, i.e. first principles, and that first principles were indeed conceived as unqualified, save for their quantitative aspect. Indeed, their unqualifiedness is aimed at a separation of different ontological levels, in the attempt to grant epistemological as well as ontological independence to each of them.
- c) In section 2.6, in the context of a similar discussion about the absence of Good in the principles, I argued that Aristotle presents a different version of Speusippus' thesis, phrased as follows: ἐξ ἀορίστων ἀτελῶν τε ἀεὶ τὰ τελειότερα, 'the more perfect things always come from those which are indeterminate and imperfect'. In the analysis, I abstained from consideration of the first adjective used by Aristotle: ἀόριστος, to be taken as referred, in my reading, to first principles. In this regard,

⁴⁵¹ Possibly, in an analogical way.

⁴⁵² Indeed, if this was not the case there would be no reason for Speusippus to deny that the first principle is good on the basis that this would imply the second principle to be evil. With 'opposed', however, I do not mean that the principles are contrary. For, as Tarán notes (1981: 40), if the principles were to be contrary, the One, insofar as it is contrary to Plurality, would be 'few'.

I only highlighted⁴⁵³ that although the context takes into account the One alone explicitly, the adjective is usually associated with the second principle and matter.

- d) In the same section, the different version of Speusippus' thesis presented by Aristotle leads, in Aristotle's eyes, to a very puzzling conclusion: the annihilation of the One. For Aristotle concludes that: 'ὥστε μηδὲ ὄν τι εἶναι τὸ ἐν αὐτό'.
- e) In section 3.2, I underlined that Aristotle criticises Speusippus for not having accounted for the generation of numbers out of the principles. In the section, I showed that the options of generation provided by Aristotle point at atomic forms of compounds, thus showing that principles fail to obtain unity in their consequents. However, in order to draw this criticism, Aristotle does not rely on his own notion of 'element' as basic constituent of compounds, a notion that would render the criticism much easier. Accordingly, I took Speusippus' conception of element to be different than Aristotle's own. Moreover, in the passage Aristotle connotes Speusippus' second principle as 'that which is universally predicated' (ἐκ τοῦ κατηγορουμένου καθόλου).
- f) In the following section (3.3) I underlined another difficulty perceived by Aristotle, namely, that Speusippus and the Platonists did not explain in what sense something is derived out of something (πῶς ἄλλο ἐξ ἄλλου ἐστίν). In particular, the discussion addressed two aspects that are interesting for our purposes: a) kinds of production which do not preserve the principles in their results; and b) the characterisation of principles as elements.

5.2 Problematising the data obtained

In general, Aristotle raises two problems concerning Speusippus' primary principles:

- i) The fact that although first principles are causes, it is not clear what kind of causes they are, and what kind of causal activity they exert on their consequents (see points e; f).

And this problem is connected to:

⁴⁵³ Chapter 2, p. 53, footnote 253.

- ii) The fact that principles are connoted as elements, in a way that is not consonant with Aristotle's own notion of element. An element, for Aristotle, needs to be prior to the things it causes, and it needs to be in some way preserved in the thing of which it is the cause. On the contrary, Speusippus' principles are said to be 'universally predicated', and indefinite (points b; c).

These two aspects are closely interrelated and have a result what I have called the 'ambiguous ontological status' of first principles (points a; d). Indeed, in the Aristotelian passages, Speusippus' first principles fluctuate between somehow being included among substances and being reduced to 'not even a thing'. This aspect is the result of Aristotle's insistence that something, in order to be a cause of a substance (i.e. numbers in the specific context), needs itself to be a substance.⁴⁵⁴ Aristotle insistently maintains that: 'substance cannot be a principle of what is not a substance, *nor a non-substance, a principle of substance*'.⁴⁵⁵ On the basis of this principle, one thing is clear: Speusippus' primary principles are inadequate in the first place, because they are defined as elements, and elements of a substance must themselves be substances.⁴⁵⁶ Given this background, we can assert that Speusippus' principles are causes, that they are connoted as elements, but are not strictly considered by Aristotle as being properly substances themselves. The obvious question to raise, then, is the following: what does Speusippus (or the Platonists) mean, by στοιχεῖον? And in what sense can an element be a cause?

5.3 Being an element, being a cause

In section 2.1, in the context of Aristotle's criticism of Speusippus' theory of the absence of good in the principles, I quoted a passage which is now again relevant for our purposes:

[FR. 79] The difficulty arises not from ascribing goodness as belonging to the first principle as an attribute, but from treating the One as a principle, and *a principle in the sense of an element*, and then deriving number out of the One.⁴⁵⁷

As we have seen, Aristotle provides his own definition of element in book Δ of the *Metaphysics*:

Στοιχεῖον λέγεται ἐξ οὗ σύγκειται πρώτου ἐνυπάρχοντος ἀδιαίρετου τῷ εἶδει εἰς ἕτερον εἶδος.

⁴⁵⁴ In this respect, and particularly in relation to a similar discussion on principles and elements in Δ4 of the *Metaphysics*, see Crubellier (2000).

⁴⁵⁵ M 10, 1087a1; N1, 1088b3, transl. Crubellier (2000: 146).

⁴⁵⁶ See, *ibid.* (2000: 150).

⁴⁵⁷ Arist., *Metaph.*, N4 1091b2-3 (=fr. 79 IP₁).

That from which something is composed, as a primary constituent that is in form indivisible into another form, is called an element.⁴⁵⁸

The following examples provided by Aristotle (things into which syllables are divisible; things into which bodies are divisible; and the things into which geometrical propositions are divisible)⁴⁵⁹ confirm that the essential meaning for ‘element’ is that of first, indivisible constituent. However, after having provided his own definition, Aristotle mentions that there are some people who make use of the term ‘metaphorically’.⁴⁶⁰

καὶ μεταφέροντες δὲ στοιχεῖον καλοῦσιν ἐντεῦθεν ὁ ἄν ἐν ὄν καὶ μικρὸν ἐπὶ πολλὰ ἢ χρήσιμον· διὸ καὶ τὸ μικρὸν καὶ ἀπλοῦν καὶ ἀδιαίρετον στοιχεῖον λέγεται. ὅθεν ἐλήλυθε **τὰ μάλιστα καθόλου στοιχεῖα εἶναι**, ὅτι ἕκαστον αὐτῶν ἐν ὄν καὶ ἀπλοῦν ἐν πολλοῖς ὑπάρχει ἢ πᾶσιν ἢ ὅτι πλείστοις· καὶ τὸ ἐν καὶ τὴν στιγμήν ἀρχάς τισι δοκεῖ εἶναι. ἐπεὶ οὖν **τὰ καλούμενα γένη καθόλου καὶ ἀδιαίρετα (οὐ γὰρ ἔστι λόγος αὐτῶν)**, στοιχεῖα τὰ γένη λέγουσί τινες [...].

The term ‘element’ is also applied metaphorically to any small unity which is useful for various purposes; and so that which is small and simple and indivisible is called an ‘element’. Hence it comes that *the most universal things are elements*; because each of them, being a simple unity, is present in many things—either in all or in as many as possible. Some too think that the One and the point are principles. Therefore, *since what are called genera are universal and indivisible (because they have no formula), some people call the genera elements* [...].⁴⁶¹

According to this passage, there are some people who make use of the term ‘element’ in a different way, applying it to any small unit. For this reason, they call ‘element’ what is small (μικρὸν), simple (ἀπλοῦν), and indivisible (ἀδιαίρετον). From this usage of the term, it results that (τὰ μάλιστα καθόλου) the most universal things are called elements as well. Indeed, as each of them is one and simple, it subsists in many things.⁴⁶² Others think that the One and the point are principles. Perhaps on the same basis, they concluded that since what

⁴⁵⁸ Transl. Malink (2017: 187).

⁴⁵⁹ See Crowley (2005: 372). In the paper, he argues that Plato, in making use of the term στοιχεῖον relies on an already current usage of ‘element’, which should not be considered as a metaphorical derivation (in a physical, metaphysical or cosmological context) from some other usage of the term.

⁴⁶⁰ Important here, as Menn (unpublished MN: 42) notes, is to highlight that: ‘Plato and the other Academics are trying to compete with the physicists’ accounts of the generation of all things out of a few ἀρχαί’.

⁴⁶¹ Aristot., *Metaph.* Δ 1014b 2-14, transl. Tredennick slightly modified. The following lines of Aristotle’s passage state that, according to this identification, the genus is considered to be more universal than the differentia. It may be interesting to compare this criticism with Aristotle’s criticism of Speusippus’ method of division in biology to see whether the critiques in the two contexts are compatible.

⁴⁶² Bechtel (2010: 37-58) has a very interesting interpretation of the ‘smallness of the One’, a feature which is evoked by later authors such as Damascius and the Anonymous Commentator of Plato’s *Parmenides*. For the scholarly reception of these passages, see *infra*, *Introduction* (xi-xv). In general, I take it to be more convincing to identify Speusippus in the Δ passage with those people who believed unity and the point to be the principles. As we have seen, the point occurs in Aristotle as one of the principles recognised by Speusippus for the geometrical realm, and in this sense the two passages are at least consistent. On the contrary, the interpretation of the One as something extremely small, occurs before this comment, which is introduced by the καί, suggesting that a different interpretation is being considered.

are called genera are universal and indivisible, genera were to be called elements as well. If we accept the identification of these few lines with the Platonists, and, in particular, with Speusippus, we are provided with more information about the theory of principles. Indeed, I believe the identification to be at least possible on the basis of the following reasons:

- i. The identification of genera with elements is provided right after the claim that, for some people, also the One and the point are principles. As we have seen, the point is listed by Aristotle as one of Speusippus' principles for geometry, and this would at least grant some consistency for the identification. Moreover, the clause is introduced by the καί, which seems to signal that different people are here to be identified than those applying the term 'element' to any small unit. This does not mean, however, that these people here introduced necessarily diverge on the opinion that elements are to be identified with the most universal things. On the contrary, this second group of people as well seem to uphold the same belief, possibly on the basis of different reasons (i.e. not necessarily relying on the smallness of the One).
- ii. If we accept the identification with the Platonists to be at least possible, Aristotle's claim that the Platonists (and Speusippus in particular) called the genera elements might shed some light on two other features that Aristotle attributes to Speusippus' first principles, namely:
 - a. the claim that Speusippus' second principle, τὸ πλῆθος, is 'universally predicated' (κατηγορούμενος καθόλου);
 - b. the fact that in *Metaphysics* Λ,⁴⁶³ if we take Aristotle to be re-formulating Speusippus' thesis⁴⁶⁴ of the unqualifiedness of first principles, these latter are said to be ἀόριστοι, indeterminate.

At this point, one final issue stands in need of clarification. Indeed, Tarán, on the basis

⁴⁶³ See section 2.6.

⁴⁶⁴ Or, as Tarán puts it, Aristotle is providing a *reductio ad absurdum* (1981: 34). However, I do not agree with Tarán that Aristotle is simply stating that 'if the principles were indefinite and imperfect, the One itself would not even be an entity', or, in other words, that the annihilation of the One is derived directly from the indefiniteness of the principles (in relation to their consequences). I believe that, even by taking the argument as a *reductio* of Speusippus', it may well be that the consequences implied, although false for Speusippus' principles, are somehow telling of how Speusippus' principles are conceived. Moreover, in Tarán's interpretation, Plurality, a definite multiplicity (Tarán 1981: 331), is not taken to work in the same way of the One, or, better, is not thought to have the same status; Tarán (1981: 40): 'And so Speusippus may have seen in multiplicity the second principle of number, without saying or implying that it is an element of number, nor the material cause of number, nor the contrary of the One'). Despite the fact that Speusippus' Plurality is defined as κατηγορούμενος καθόλου, in many passages, and in the passage in *Metaphysics* Λ in particular, the two principles are at stake, and not the One only.

that ‘Speusippus did not hypostatize the universals’⁴⁶⁵ argues that the One is the principle of number and the first number at the same time, i.e. ‘the first unit of units’.⁴⁶⁶ And the same holds good for the point, insofar as it is principle of magnitudes and first magnitudes. However, I take the One (and Plurality) to be other than numbers and to be something different from them. This is for two reasons. First, as already mentioned, I take information about each principle to be valid for the other as well. For, when principles are singled out, I take this to be usually the result of the context of Aristotle’s arguments, which are pointing at flaws in one of them specifically. Secondly, Speusippus’ principles are often paired together, when Aristotle speaks of them as elements, and this means, at least, *that to the extent that they considered elements* they work in the same way.⁴⁶⁷ It must be said that this strategy, however, leaves us with the difficulty of explaining the status of the principles, not assuming that they are entities themselves, since Aristotle’s testimony is at least consistent in saying that numbers are the first ὄντα, and not the One and Plurality. I believe that the best explanation for this aspect is to follow Aristotle’s suggestion and take primary principles as *the most universal genera*, and to consider them, in this sense, as principles and elements of numbers. For, if each number is a definite collection of units, each and one of them will be, to some extent, one and many. Indeed, this would make of the One and Plurality the most universal predicates of all numbers.⁴⁶⁸ In this respect, my interpretation is closer to Isnardi Parente’s,⁴⁶⁹ who takes Speusippus’ primary principles to be the ‘primary condition’ of numbers. However, Isnardi Parente is not at all clear as to what this amounts to. For there is another issue which remains to be solved and makes it difficult to understand what it means for the principles to be the condition of numbers: to what extent can principles, conceived as the most universal genera, be thought to be causes? In section 2.3, I concluded that of the premises of Speusippus’ thesis reported by Aristotle, the claim that ‘principles are causes’ was genuinely Speusippean.⁴⁷⁰ In this sense, it is worth asking what kind of causes Aristotle would identify them with.⁴⁷¹ But it is quite clear from Aristotle’s reports that Speusippus’ principles cannot be material causes, for, otherwise, they would be somehow ‘contained’, in

⁴⁶⁵ Tarán (1981: 34-37).

⁴⁶⁶ Tarán (1981: 38). With this interpretation, however, the One itself is reduced to a unit, and therefore it would not be clear why Aristotle says that it becomes ‘not even a thing’.

⁴⁶⁷ While in this respect, Tarán’s principles are indeed differentiated (see, above, footnote 468).

⁴⁶⁸ It should be said that this interpretation does not offer a sufficient explanation of number one, if Speusippus actually took it to be a number, as for example Tarán believes (1981: 32-47) and as can be extrapolated from ps-Iamblichus’ quotation (=fr. 122 IP₁). However, the consideration of the One as a principle does not exclude its arithmetical employment (see Acerbi 2010: 236ff). For a compatible view, see Burnyeat (1987: 170, n. 63 in particular).

⁴⁶⁹ Isnardi Parente (1980: 58-59). It must be said that in the second collection of the fragments, Isnardi Parente does not go back to primary principles in much detail.

⁴⁷⁰ See, *infra*, Chapter 2.

⁴⁷¹ To understand the precise mean in which cause is meant by the Platonist is a usual concern for Aristotle, also with respect to Plato.

their consequents;⁴⁷² they cannot be generative causes either,⁴⁷³ as the criticism in *Metaphysics* M has shown; and they can neither be efficient causes, as otherwise they would be required to be entities themselves, which, as we have just seen, cannot be the case.⁴⁷⁴ Lastly, they cannot be final causes either, because the analogy with the seed implies precisely that the fulfilment of the seed will be plants, and it is the seed, and not plants, which is the vehicle for the identification of the principles. We are left with some kind of formal cause: principles are that by reason of which numbers are numbers. And they are so, in a precise way: they represent the explanatory cause, and therefore the analytical cause, for numbers to be numbers.⁴⁷⁵

I take this interpretation to be possible, and to represent the best attempt to make sense of the frictions encountered so far in Aristotelian accounts of Speusippus:

First of all, insofar as they are explanatory causes, Speusippus' principles are not 'entities' themselves, or, as Aristotle puts it, οὐσίαι. This would explain the ambiguity of the ontological status that Aristotle attributes to first principles in different passages of his corpus as well as why he characterises them as κατηγορουμένοι καθόλου and ἀόριστοι (possibly indefinite insofar as they are unqualified). First principles are not hypostatised, and as such they cannot be fairly compared to Plato's Forms, and cannot receive the same criticisms (e.g. that of the Third Man, accounting for the qualification of sensible objects); at the same time, they are not substances themselves, and they are not separated, although they are prior.

Secondly, this may shed light on Aristotle's criticism related to the priority of the principles. In Chapter 2, I concluded that Aristotle is trying to show that Speusippus assumed what is prior *in time* to be also *ontologically* so. However, if Speusippus' primary principles are conceived as explanatory causes and, as such, as the most universal genera of numbers, this may explain a) why Aristotle assumes them to be somehow prior *in time*, and b) why in the first place Aristotle is addressing this criticism at all. In fact, according to this

⁴⁷² See the criticism related to unity, in Chapter 3. Moreover, they cannot even be paradigmatic causes, since number is said to be a reality by itself, and since otherwise Speusippus would be liable to the Third Man argument.

⁴⁷³ Pace, Dillon (2003: 40ff).

⁴⁷⁴ Moreover, as it has been highlighted already, numbers do not allow any kind of movement or change.

⁴⁷⁵ To put it anachronistically, we can think of Kant's definition of analytical judgement (Kant, *Critique of pure reason*, A6, 'the predicate B belongs to the subject A as something that is (covertly) contained in this concept', transl. P. Guyer and E. Matthews. For numbers, for instance, this may be their quantitative aspect in the first place. One may note that such (modern) definition would also account for a conception of 'element' as basic constituent, conceived in a non-metaphorical way. On the use of a non-metaphorical meaning of element, see Crowley (2005).

interpretation Speusippus' primary principles would neither be prior temporally nor ontologically, but only analytically. This would result in a very strange 'principle', from an Aristotelian perspective, which is only nominally a cause.

Third, this would account for the fact that Aristotle insists on claiming that Speusippus did not make any effort to explain how numbers are generated out of the principles: primary principles do not produce numbers, and they are not generative in any way, although they are the condition upon which numbers can be understood. Given this explanation, Speusippus would not be negligent for not accounting for how numbers are generated out of the principles; on the contrary, such an account is not required at all.

Lastly, this might explain why Speusippus' primary principles are to be considered elements of numbers as well, both from a metaphorical conception of 'element' and from a more material one (closer to Aristotle's own definition).⁴⁷⁶ Indeed, if primary principles are analytically conceived, they are somehow 'present' in all numbers, insofar as they can be predicated of them all. However, taken metaphorically, primary principles are elements of number because they represent the explanatory cause of numbers, and their most universal genera.

Unfortunately, as to principles, we cannot go further than this tentative answer. However, it would be fascinating to conjecture that it was precisely Speusippus' conception of principles (insofar as they are explanatory causes and analytically conceived) that suggested to the philosopher a separation of the various ontological levels, and the consequent postulation of principles for each of them in order to obtain an epistemologically sustainable project. Or, at least, to suppose the two assumptions are intimately intertwined. In this respect, an explanatory conception of principles, would account also for an empirically-based inquiry of the sensible world, as well as for a heuristic method of research. Lastly, one might be tempted to go further, and suppose that the discussion Speusippus held with Menaechmus was indeed, in the first place, a discussion about the notion of element itself.⁴⁷⁷ If this was to be the case, it would reveal that the discussions taking place within the

⁴⁷⁶ Although I am inclined to accept a 'metaphorical' interpretation of στοιχεῖον for Speusippus, rather than a material one. Indeed, in *Metaphysics* M (see Chapter 3), when referring to Speusippus, Aristotle takes into account principles which are not preserved in their results, so implying that Speusippus' primary principles are also to be considered as 'external principles'.

⁴⁷⁷ For Menaechmus definition of element, see the fr. preserved in Lasserre (1987: 117-125, fr. 6 in particular; 329-336; 545-559). On Menaechmus, see Fuentes Gonzáles (in Goulet 2005); on this discussion within the Academy and Menaechmus' circular proof, see also Barnes (1976), Bowen (1983), De Haas (2011). For an opposite opinion about the possibility of identifying Menaechmus as an Academic, see Zhmud (1998).

Academy cannot be reduced to either purely mathematical quarrels or philosophical speculations. On the contrary, this would establish a much more fruitful interrelation and interchange between the two fields, resulting in refined conjectures about the ontological status of mathematical number and of the status of scientific research in general.

Section II: Xenocrates

CHAPTER SIX:

The μία φύσις of τὰ μαθηματικά

At the outset of the preceding chapter, I gathered a set of general claims to guide my interpretation of Speusippus' philosophy. Similarly, this chapter on Xenocrates offers an initial examination of Xenocrates' philosophy, and, in particular, of his metaphysics. Aristotle's *testimonia* on Xenocrates, contrarily to those preserved about Speusippus, are less numerous, and accordingly, more suitable for a thematic arrangement of specific issues. Accordingly, this chapter will initially present Aristotle's general views of Xenocrates' philosophy, and, in particular, his analysis of numbers and Forms.

Before advancing his core arguments against Plato and his successors, Aristotle usually provides a short presentation of the philosophical tenets of their systems. In such overviews, Xenocrates is usually referred to as that person who posited a μία φύσις for mathematical objects and Forms. This formula, beyond its immediate meaning, provides crucial information about Xenocrates' metaphysics. Thus, the chapter will aim to: (i) identify and explain which objects are at stake when Aristotle speaks of 'one nature'; (ii) consider what kind of relationships these objects entertain to one another. For this reason, both soul and principles will be excluded from my analysis here.⁴⁷⁸

In order to fulfil these aims, the chapter will be divided into five sections. Section 6.1 will present Aristotle's general views of Xenocrates' metaphysical doctrines, where we learn that Xenocrates posited *one nature* for Forms and τὰ μαθηματικά. Section 6.2 will test the formula 'μία φύσις' in the broader context of Aristotle's corpus so to understand what the formula implies, and what consequences the formula entails once it is transposed to the context of Xenocrates' metaphysics. Lastly, section 6.3 will deal with Xenocrates' claim that 'parts are prior to the whole'. Through a direct analysis of Form-Numbers and Ideal-Geometrical objects, the section will show that the claim illuminates directly how Form-Numbers and Ideal-Geometrical objects are conceived and can be explained through their reciprocal relation. By considering the line as the atomic counterpart of the unit in geometry, the structural similarities of both will immediately become clear.

⁴⁷⁸ Soul will be the focus of the Chapter 7.

6.1 Aristotelian testimonia of Xenocrates: merging Forms with τὰ μαθηματικά (fr. 27; 26; 29)

Let us start with a brief outline of Xenocrates' metaphysics as we find it in the Aristotelian corpus. At the beginning of *Metaphysics* M, Aristotle, while investigating the possibility of the existence of something immutable and eternal beyond sensible substances (πότερόν ἔστι τις παρὰ τὰς αἰσθητὰς οὐσίας ἀκίνητος καὶ ἄδιος ἢ οὐκ ἔστι),⁴⁷⁹ provides us with an outline of previous positions about the topic:

[FR. 27] Δύο δ' εἰσὶ δόξαι περὶ τούτων· τὰ τε γὰρ μαθηματικά φασιν οὐσίας εἶναι τινες, οἷον ἀριθμοὺς καὶ γραμμὰς καὶ τὰ συγγενῇ τούτοις, καὶ πάλιν τὰς ιδέας. ἐπεὶ δὲ οἱ μὲν δύο ταῦτα γένη ποιοῦσι, τὰς τε ιδέας καὶ τοὺς μαθηματικοὺς ἀριθμούς, οἱ δὲ μίαν φύσιν ἀμφοτέρων, ἕτεροι δὲ τινες τὰς μαθηματικὰς μόνον οὐσίας εἶναι φασι, σκεπτέον πρῶτον μὲν περὶ τῶν μαθηματικῶν, μηδεμίαν προστιθέντας φύσιν ἄλλην αὐτοῖς [...].⁴⁸⁰

There are two views on this subject. Some say that mathematical objects, i.e. numbers and lines, and things of the same kind, are substances; and others again that the Forms are. Now since some posit these as two classes - the Forms and the mathematical numbers - and others posit **one nature for both**, and yet others hold that mathematical objects alone are substances, we must first consider the mathematical objects without imputing to them any other characteristic [...].

Although Aristotle is not immediately clear in his account (at first there are two positions, and then they seem to be divided into three), scholars have nonetheless agreed on the attributions of the positions under examination:

The first distinction is presented as follows: view a) states that mathematical objects are substances, while view b) that Forms are. Since this first articulation presents two kinds of objects, a second distinction is necessary to explain which classes have been acknowledged by previous philosophers, and how. Accordingly:

1) some people recognise that there are two classes of substances: that of Forms, and that of mathematical numbers (and here Aristotle is thinking of Plato);⁴⁸¹

⁴⁷⁹ Linking back the discussion to books Z, and 'forward' to book Λ of his *Metaphysics*. On the reasons to take the inquiry of book Λ as being announced here, see, Crubellier (1994: 29).

⁴⁸⁰ (=Arist., *Metaph.* M 1, 1076a16-24), transl. H. Tredennick, slightly modified. In Isnardi Parente's edition, only the lines referring to Xenocrates (19-21) appear.

⁴⁸¹ Annas (1976: 136) comments that 'Aristotle is slightly careless here', and that 'in line 20' (namely, when he speaks of Plato), 'we should understand 'mathematical objects' for 'mathematical number''. However, I agree with Crubellier (1994: 85), who finds a better explanation for the shift in terminology, explaining that, on the one hand, the τινές is meant to be more inclusive (and, according to him, it may refer to all the positions in the Academy), while, on the other hand, the second formulation (mathematical numbers) is referred to Plato only.

2) other people regard both classes as having one nature, and here, the position presented is Xenocrates’;

3), some other people hold that mathematical substances alone exist: and here, even if it is not precisely described, this is Speusippus’ position.⁴⁸²

According to Aristotle’s description, then, Xenocrates’ position can be summarised as follows: the philosopher posits one nature for both classes (οἱ δὲ μίαν φύσιν ἀμφοτέρων) of substances, i.e. Forms and mathematical objects. Owing to this account, Xenocrates’ position is usually described as merging Forms and Numbers in some sort of composite: Form-Numbers. Although this summary is certainly justified by another reference to Xenocrates in M (*Metaph.* M 6 26-31), which I will examine shortly, I think it is also important to draw the attention to another aspect. While describing the two classes of substances, Aristotle speaks generically of τὰ μαθηματικά and then qualifies his statement by saying that these do include, for example, numbers, lines, and things of this sort (οἷον ἀριθμοὺς καὶ γραμμὰς καὶ τὰ συγγενῇ τούτοις).⁴⁸³ Now, although the example could be considered not necessarily significant — as it is common to speak of τὰ μαθηματικά as including not only numbers, but also geometrical objects (in this specific case, lines minimally) — there are at least two reasons to consider the examples as more suggestive:

1- In the second bifurcation the metaphysicised objects in question change according to the people Aristotle refers to. With respect to Plato, although Aristotle was initially speaking of mathematical objects in general (τὰ μαθηματικά), he specifies that the two classes are represented by Forms (ιδέαι) and mathematical numbers (μαθηματικοὶ ἀριθμοί) — and Aristotle is consistent in attributing this position to Plato.⁴⁸⁴ Accordingly, Aristotle’s use of ἀμφοτέρων

⁴⁸² As emphasised in Section I, it is not easy to disentangle Aristotle’s information about the Platonists’ conception of οὐσία and its inclusivity. I take the lines about Speusippus to mean that, with respect to Forms and mathematical objects (presented in the first distinction as the two options), Speusippus would reject that the first exist, and will therefore accept only the existence of the second (as οὐσίαι, without implying that being an οὐσία is limited to mathematical objects *only*). In Crubellier’s words (1994: 86): ‘Il faut évidemment comprendre que ce seraient les seuls êtres non-sensibles et éternels, et non pas que ce seraient absolument les seules réalités existantes’. We should not forget that the focus of the discussion, as stated by Aristotle at the beginning of book M, is to inquire ‘whether there is or not some immutable and eternal substance *besides sensible substances* (παρὰ τὰς αἰσθητὰς οὐσίας)’ (Arist., *Metaph.* M1, 1076a11-12, transl. Tredennick). It is interesting to note, also, that Speusippus is referred to as having established the existence of ‘τὰς μαθηματικὰς οὐσίας’. If we want to square this information with the list provided by Aristotle in Z2, we may find another confirmation of a unitarian conception of the mathematical realm. Indeed, we can consider magnitudes as being included here, and, possibly, even soul (if we accept to consider it, to some extent, a mathematical substance).

⁴⁸³ Crubellier (1994: 86) notes that the τούτοις is referred to γραμμὰς. Therefore, the objects here at stake are precisely surfaces and solids.

⁴⁸⁴ See, e.g. Arist., *Metaph.* Z2 1028b19-21: ὥσπερ Πλάτων τά τε εἶδη καὶ τὰ μαθηματικά δύο οὐσίας, τρίτην δὲ τὴν τῶν αἰσθητῶν σωμάτων.

in Xenocrates' presentation could either refer to what is listed in Plato's position, Forms and mathematical numbers, or to the two classes of substances presented at the beginning, Forms and mathematical objects (and I am inclined to accept this second option as more convincing since, even in the presentation of Speusippus' position, we have again the more general term τὰς μαθηματικὰς οὐσίας).

2- The reference to numbers and lines specifically, and not to other geometrical objects more generally, could (i) either recall Xenocrates' theory of Form-Numbers and of indivisible lines, or (ii) it could confirm that Xenocrates considered geometrical objects too in the class of τὰ μαθηματικά.

Moreover, Aristotle's consistency in describing Xenocrates' position in this specific respect (i.e. speaking of Forms and mathematical objects *in general*) can be further evidenced by two other passages, which I will briefly analyse here. The first one occurs at the beginning of Λ, where Aristotle presents the inquiry he will pursue:

[FR. 26] Οὐσῖαι δὲ τρεῖς, μία μὲν αἰσθητή—ἥς ἢ μὲν αἰδῖος ἢ δὲ φθαρτή, ἣν πάντες ὁμολογοῦσιν, οἷον τὰ φυτὰ καὶ τὰ ζῷα [ἢ δ' αἰδῖος]—ἥς ἀνάγκη τὰ στοιχεῖα λαβεῖν, εἴτε ἓν εἴτε πολλά· ἄλλη δὲ ἀκίνητος, καὶ ταύτην φασὶ τινες εἶναι χωριστήν, οἱ μὲν εἰς δύο διαιροῦντες, οἱ δὲ εἰς μίαν φύσιν τιθέντες τὰ εἶδη καὶ τὰ μαθηματικά, οἱ δὲ τὰ μαθηματικά μόνον τούτων. 485

485 = Arist., *Metaph.* Λ1, 1069a30-35, transl. Tredennick, pp. 123-125 slightly modified. In Isnardi Parente's edition, only lines 33-35 are reported. [FR. 23] IP (=Arist., *Metaph.* Z2 1028b24-27) provides a third overview of Xenocrates' metaphysics: ἐνιοὶ δὲ τὰ μὲν εἶδη καὶ τοὺς ἀριθμοὺς τὴν αὐτὴν ἔχειν φασὶ φύσιν, τὰ δὲ ἄλλα ἐχόμενα, γραμμὰς καὶ ἐπίπεδα, μέχρι πρὸς τὴν τοῦ οὐρανοῦ οὐσίαν καὶ τὰ αἰσθητὰ 'some again **hold that the Forms and the numbers have the same nature**, and that other things – lines and planes – follow closely; and so on back to the substance of the visible universe and sensible things' transl. Tredennick slightly modified. Here Aristotle establishes that Forms and *numbers* have the same nature, rather than speaking more broadly of 'mathematical objects' as he does, for instance, with respect to Plato (see n. 484. In this respect, Aristotle's terminology is fluctuating with respect to both authors). And in fact, *other* objects we would expect to be inclusively considered as τὰ μαθηματικά, such as lines and solids, are labelled 'τὰ ἄλλα' and said to follow closely (or, on a stronger interpretation 'to be dependent upon', as in Tredennick's translation). However, we should not forget that, in Z2, Aristotle is listing Xenocrates as part of that group who established the existence of substances *beyond* sensible bodies (i.e. with Plato and Speusippus). And it is not an accident, then, that such τὰ ἄλλα follow closely *until* the οὐσία of the visible universe and sensible things. Accordingly, (ideal) geometrical objects such as lines and planes are surely *not identical* with Form-Numbers, but they are nonetheless closer to them than to sensible substances (and this is paralleled by [FR. 26]). One may add that neither in [FR. 23] nor elsewhere Aristotle explicitly distinguishes numbers from lines and planes *in kind* (as he does in his list of Speusippus' οὐσῖαι). Indeed, in [FR. 23] we only have a distinction in terms of succession (on a weaker account) or dependence (on a stronger account). Accordingly, in trying to characterise what specific status geometrical objects are granted with in Xenocrates' metaphysics, we cannot exclude the possibility that they are, *too*, merged with Forms. Moreover, the terminology employed by Aristotle is various, and he sometimes affirms (as observed in [FR. 26] and [FR. 27]) that the class of *mathematical objects* more broadly is merged with Forms. As a matter of fact, the apparent imbalance between different formulations can be inverted by considering [FR. 38] (=Arist., *Metaph.* N3 1090b21-24; 31-2) which will be taken into account in the next section. The passage reads: οὗτοι μὲν οὖν ταύτην προσγλιχόμενοι ταῖς ιδέαις τὰ μαθηματικά διαμαρτάνουσιν. With Cherniss' words (1971: 85, n.1): 'προσγλιχόμενοι ταῖς ιδέαις τὰ μαθηματικά' here means '*combining*' or '*identifying*' the ideas and the mathematical', my emphasis.

There are three kinds of substance. One is sensible (and may be either eternal or perishable; the latter, e.g. plants and animals, is universally recognised); of this we must apprehend the elements, whether they are one or many. Another is unmoved, which certain thinkers hold to exist as separate; some dividing it in two, **others placing the Forms and the objects of mathematics in one nature**, and others (recognising) only the objects of mathematics as of this nature.

Once again, we find Aristotle here describing the positions of Plato and his immediate successors: concerning the ἀκίνητος οὐσία, Plato and the Academics held different beliefs. Some of them, apparently, divided it into classes (here, once again, the description is reminiscent of Plato); others placed Forms and mathematical objects in one class (and here the reference is to Xenocrates); while others, namely Speusippus, recognised only mathematical objects (i.e. they refused the existence of Forms). Aristotle is more explicit here than in [FR. 27]. The formulation does seem to substantiate that the combination of the two classes concerns Forms and *mathematical objects in general*, and *not numbers only*. In this respect, one point needs to be clarified: what I am arguing *is not* that Xenocrates did not postulate the existence of Form-Numbers, but, rather, that Aristotelian *testimonia* are somehow consistent in showing that *other objects as well*, i.e. geometrical objects, have the same or a similar status granted to Form-Numbers.

That other objects are granted a similar status to that of Form-Numbers might not be obvious from reports such as that we shall consider next. When Aristotle speaks of Xenocrates' Form-Numbers, and represents his view as the most problematic, he usually points out at a difficulty that Form-Numbers *specifically* have: namely, that, according to Aristotle, the way they are conceived renders mathematical practices impossible. In this specific context, Aristotle does not need to show that Form-Numbers, *as well as* geometrical objects, subvert the rules of mathematical practices; it is enough for him to show only that Form-Numbers do. As Form-Numbers provide a better opportunity for Aristotle to criticise Xenocrates and show his anti-mathematical approach, in this context he does not need to address his criticism to geometrical objects as well. However, the testimony offers another parallel between Xenocrates' treatment of *number* and his treatment of geometrical objects. For Aristotle's complaint that Xenocrates constructs peculiar hypotheses in order to substantiate his views is addressed to geometrical objects *too*. Moreover, the testimony may be useful also in a different respect: if the two kinds of objects are actually comparable, features describing one may be used in order to establish Xenocrates' views on the second.

Accordingly, let us turn to Aristotle's description of Xenocrates' Form-Number:

[FR. 29] Φανερόν δ' ἐκ τούτων καὶ ὅτι χεῖριστα λέγεται ὁ τρίτος τρόπος, **τὸ εἶναι τὸν αὐτὸν ἀριθμὸν τὸν τῶν εἰδῶν καὶ τὸν μαθηματικόν**. ἀνάγκη γὰρ εἰς μίαν δόξαν συμβαίνειν δύο ἀμαρτίας· οὔτε γὰρ μαθηματικὸν ἀριθμὸν ἐνδέχεται τοῦτον εἶναι τὸν τρόπον, ἀλλ' ἰδίας ὑποθέσεις ὑποθέμενον ἀνάγκη μηκύνειν· ὅσα τε τοῖς ὡς εἶδη τὸν ἀριθμὸν λέγουσι συμβαίνει, καὶ ταῦτα ἀναγκαῖον λέγειν.⁴⁸⁶

From these considerations it is also clear that the third alternative—that the number of the Forms and mathematical number are the same—is the worst; for two errors have to be combined to make one theory. (i.) Mathematical number cannot be in this way, but the propounder of this view has to spin it out by making peculiar assumptions; (ii.) his theory must admit all the difficulties which confront those who speak of ideal number.⁴⁸⁷

The third alternative mentioned here is Xenocrates'. However, his view described here states that ideal number and mathematical number are the same.⁴⁸⁸ Just as we noticed for [FR. 27], also in [FR. 29] we have a clash between two different classes: that of ideal number and that of mathematical number. But the result is *not a combination*: rather, it is the conflation of mathematical number within the ideal one. Within this framework, by *combination* I mean a result that bears features of both classes (i.e. the number resulting out of a combination of the two classes would be (i) composed by units allowing for

⁴⁸⁶ = Arist., *Metaph.* M8, 1083b1-8, transl. H. Tredennick. Isnardi Parente's edition includes in the section the preceding lines 1083a31ff.

⁴⁸⁷ Cf. Crubellier's gloss (1994: 347) on this last sentence, which makes the reading more intelligible: 'ils veulent attribuer au nombre une nature qui permette de soutenir l'affirmation: les idées sont nombre'. In general, Aristotle does not say much about the identification of mathematical and ideal number (and Crubellier (1994: 286) defines Aristotle's references to this theory as 'méprisantes', contemptuous), although analogous critiques occur in other passages of the *Metaphysics* (see, e.g. N3 1090b32-a5, and A9 991b27-31), and the same criticism returns in M9 1086a5-12 (=fr. 30 IP). Crubellier (1994: 354) concludes that, with respect to this doctrine, Aristotle seems to be pitting the arguments of the Academics one against the other. The general sense of the argument can be resumed as follows: there are no other principles, except for the One and the Dyad, out of which mathematical number could be derived. Accordingly, since the two kinds of number must be derived out of the same principles, there cannot be any difference between them. Crubellier (ivi) proposes as a solution the possibility that ideal numbers work as principles of mathematical numbers (e.g. the three mathematical units are recognisable as 'three' with reference to the ideal Triad). In general, if Aristotle is really pitting the arguments of different people against one another, we may speculate that Xenocrates either (i) did not postulate mathematical number *at all* or (ii) that, for whatever reason, he did not find his Form-Numbers problematic with respect to mathematical operations. This way, the conflation of mathematical and ideal number may be the result of Aristotle's own criticism and may not reflect straightforwardly Xenocrates' position on the topic. In the end, it would be enough for Xenocrates' to say that Form-Numbers do allow mathematical practices, in order for Aristotle to conclude that ideal and mathematical number are the same. A third option (which I am inclined to accept) is that Xenocrates, when pressed about where mathematical number would fit in his system, or about the impossibility for Form-Numbers to allow for mathematical operations, answered that Form-Numbers are *also* mathematical, or that mathematical number is *nothing else than* Form-Number.

⁴⁸⁸ See also fr. 28 IP: ἄλλος δὲ τις τὸν πρῶτον ἀριθμὸν τὸν τῶν εἰδῶν ἓνα εἶναι, **ἐνιοὶ δὲ καὶ τὸν μαθηματικὸν τὸν αὐτὸν τοῦτον εἶναι**) and 30 IP: οἱ δὲ τὰ εἶδη βουλόμενοι ἅμα καὶ ἀριθμοὺς ποιεῖν, οὐχ ὁρῶντες δέ, εἰ τὰς ἀρχὰς τις ταύτας θήσεται, πῶς ἔσται ὁ μαθηματικὸς ἀριθμὸς παρὰ τὸν εἰδικόν, **τὸν αὐτὸν εἰδητικὸν καὶ μαθηματικὸν ἐποίησαν ἀριθμὸν** τῷ λόγῳ ἐπεὶ ἔργῳ γε ἀνήρεται ὁ μαθηματικός (ἰδίας γὰρ καὶ οὐ μαθηματικὰς ὑποθέσεις λέγουσιν). Moreover, the identification between mathematical and ideal number is used (in addition to the reference to 'now' at 1218a16) in order to identify other Aristotelian passages (as, e.g. Fr. 13 IP = Arist., *EE* I 8, 1218a24-8, as referring to Xenocrates. In the passage Aristotle is criticising a Platonist view about the relation between numbers and (the) Good. According to the testimony, Xenocrates held that the numbers 'tend towards' (ἐφίενται) the one - Aristotle does not give an object for ἐφίενται, but that the meaning should be understood as a conation towards something can be understood from the following lines.

combinability – as mathematical units do – *and* (ii) would be characterised as a Form, whatever way Xenocrates conceived of a Form); by *conflation* I mean that that features of one of the two classes are absorbed within or ruled over by the features of the second one (i.e., as Aristotle appears to complain here: although Form-Numbers are composed by units, their units *do not* allow for combinability, *because* Form-Numbers are conceived of as Forms). Now, Aristotle’s problem, as I shall point out in more detail further on in this chapter, is connected to Xenocrates’ conception of Form-Numbers. From a broader perspective, Aristotle complains that these two classes cannot be merged together without generating contradictions. From a narrower perspective, Aristotle objects that Form-Numbers are composed by units, just like mathematical number, but their units, differently from what is granted by mathematical practices, are not properly combinable with units of other Form-Numbers. Accordingly, Aristotle accuses Xenocrates of rendering mathematical practices (especially arithmetic) impossible. But the charge of having created peculiar hypotheses, which do not accommodate mathematical practices, is not restricted to Xenocrates’ Form-Numbers.⁴⁸⁹ On the contrary, elsewhere⁴⁹⁰ Aristotle criticises Xenocrates on the basis of his geometrical assumptions *too*: Aristotle complains that for Xenocrates not every magnitude is divisible into other magnitudes, *just as* he complains that not any two units compose the Dyad.⁴⁹¹ In this respect, Form-Numbers as well as (ideal?) geometrical objects do share the same status: for none of them respects the rules of mathematical or geometrical practices and both are constructed according to peculiar hypotheses.

One might wonder why I am drawing so much attention to something that, in Aristotle’s testimony, may seem trivial. The reason is simple: my aim is to show that Aristotle’s testimony gives us ground to suppose the existence of Forms, or, at least, eidetic kinds of geometrical objects as well (for the moment we will leave aside the question of whether these are somehow identified with Form-Numbers, or whether they are derived from them⁴⁹²). I am not, to be sure, completely alone in considering this option.⁴⁹³ Whether

⁴⁸⁹ Crubellier (1994: 286) notes that the charge of positing peculiar hypotheses can be understood in two ways: a) positing hypotheses peculiar to the person who enounces them; b) hypotheses *ad hoc*, which attribute to the objects in question paradoxical properties. The two options are not reciprocally exclusive, as he notes.

⁴⁹⁰ See, e.g. fr. 39 IP = Arist., *Metaph.* M6 1080b23-30.

⁴⁹¹ *Ivi*.

⁴⁹² See footnote 485.

⁴⁹³ For a positive view, see Robin (1908: 286-293), Cherniss (1945: 484; 1959: 47-48 specifically), Tarán (2001: 595) and Dillon (2013: 111-112ff). For a negative view, see Isnardi Parente (1986: 278ff). Most of the scholarly debate revolved around the expression ‘τὰ μετὰ τὰς ιδέας’, employed by Aristotle in *Metaph.* M6 1080b24, and about whether these objects are to be found in Plato or not (see, e.g. Ross, 1951; Gaiser 1998 and Krämer 1971 for a positive answer). The passage reads: ‘The same applies in the case of lines, planes and solids. Some distinguish mathematical objects from those which come after the Forms (οἱ μὲν γὰρ ἕτερα τὰ μαθηματικὰ καὶ τὰ μετὰ τὰς ιδέας)’, transl. Tredennick slightly modified. But right after this expression, Aristotle turns to those who speak differently (τῶν δ’ ἄλλως λεγόντων, οἱ μὲν [...] οἱ δέ’ and lists two positions

Platonists postulated the existence of Ideal magnitudes or not, has been object of a very lively dispute among scholars, who have concentrated mainly on three Aristotelian passages (namely, *Metaph.* A9 992b 13-18; M 1080b 28ff; N3 1090 b2 ff; A9 992b 13-18) in order to establish (i) whether the passages can be considered determinant for attributing such a theory to Plato, and (ii) whether they allow us to project any views on Plato's successors.⁴⁹⁴ However, to my knowledge the attribution of a theory of Ideal Geometricals, or of eidetic kinds of geometrical objects to Xenocrates, has never been established on the ground of Aristotle's overviews of Xenocrates' metaphysics.⁴⁹⁵ But I believe such a possibility should be entertained for the following reasons:

- a) As we have seen, Aristotle's terminology is not consistent. Forasmuch as one may want to play down this aspect as the result of the different objections raised against

which are easily ascribable to Speusippus and Xenocrates (namely, some, i.e. Speusippus, speak of mathematical things in a mathematical way, while others, i.e. Xenocrates, speak of mathematical objects but *not* in a mathematical way). Accordingly, the debate about who to ascribe the position of a distinction between mathematical objects and objects which follow after the Forms will not concern our present inquiry. It is interesting to note, however, that Isnardi Parente cuts lines 1090b24-31 from [FR. 38], which are precisely the lines Cherniss (1945: 484) appeals to in order to show that Xenocrates 'used the same material principle for the ideas (which he identified with numbers) and magnitudes, explaining the difference by different formal elements'. Once again, if Form-Numbers and magnitudes share the same material principle, they must have, at least, a similar ontological status.

⁴⁹⁴ Winzenrieth has done a great job of summarising the main points at stake in the discussion (2018: 70ff), as well as of showing that a theory of 'ideal magnitudes' as such, cannot be attributed to Plato, but is, contrarily, the result of scholarly interpretations of Aristotle's criticism on the topic. With his words: 'Loin d'avoir commis un contre-sens grossier à propos des doctrines de celui qui fut son maître, Aristote aurait alors simplement tiré les conséquences de son refus de tels engendremens mathématisants à partir des principes. [...] Les entités géométriques, que Platon entend fonder et définir à partir du nombre, sont ainsi réduites à des vestiges à l'identité incertaine, planant au-dessus des lignes, surfaces et figures de la science mathématique' (2018: 89).

⁴⁹⁵ Isnardi Parente (1984b: 272-274) acknowledges that Aristotle sometimes refers to *mathematical objects* more broadly. However, she refuses to accept 'that Xenocrates actually held a theory according to which the whole domain of mathematical science is absorbed by the metaphysics of Forms' (my translation). Although she sees a parallel for such a 'confusion between ideal and mathematical' in the peripatetic treatise *On Indivisible Lines*, Isnardi Parente believes Geminus' geometrical account of the indivisible lines' theory to be the only 'reasonable' (1984b: 275, n.33). For Geminus (*In Eucl.* I, 277, 25ff Friedlein) 'la résolution de l'espace en parties ultimes devient possible si l'on réduit ces parties – la ligne, en ce cas – à leur valeur infinitésimale: par cette voie on peut parvenir aussi à justifier cette théorie très singulière qui semble démentir certains principes fondamentaux de la science géométrique, telle que la théorie des incommensurables' (1984: 275). However, I do not see why we should prefer Geminus' interpretation over Aristotle's and that preserved in the Peripatetic *On Indivisible Lines* on the basis that the domain of Forms is beyond space. Indeed, the assumption seems to me to be justified only by appeal to Plato's Theory of Forms. However, with similar assumptions analogous problems would arise with respect to movement, absent by definition in the characterisation of mathematical entities. Of course, movement does occur in Xenocrates' definition of the soul as a 'self-moving number', although the soul *qua* number can be included among mathematical objects. For, establishing that Forms are beyond space and time, has, in Plato's account, the aim of separating the realm of Forms from that of sensibles, in a continuous status of change. However, such a neat separation is precisely what seems to be absent in Xenocrates' world, which appears to be thought as much more continuous than Plato's. For this reason, I am not convinced that the only possible consideration of spatial extension should be physical. On the contrary, I believe Xenocrates establishes *at least* the formal conditions for spatial extension to arise, in the attempt to explain in a more continuous way than Speusippus' how reality deploys. I do recognise, however, that my thesis implies a difficulty, when it comes to a precise identification of what these Ideal-Geometrical are precisely or, better, of what geometrical objects are postulated as Ideal. However, in absence of compelling evidence, I believe my thesis to be more natural on the basis of Aristotle's reading.

Xenocrates (or other Platonists), the fluctuation between claiming that Xenocrates established a *μία φύσις* for Forms and numbers and a *μία φύσις* for Forms and mathematical objects, leaves open the possibility of a conflation of the whole mathematical level and Forms.⁴⁹⁶

- b) The conflation of mathematical and ideal number, I believe, offers one more reason to entertain the possibility of eidetic kinds of geometrical objects. If mathematical and ideal number are essentially coinciding, on what basis could Xenocrates justify that geometrical objects are granted a different status? It would be simpler to suppose that geometrical objects are to be granted either the same, or a similar status to that of Form-Numbers.⁴⁹⁷ For otherwise, the ontological hierarchy becomes much more difficult to account for.
- c) In support of this hypothesis, a comparison with Speusippus may also be advanced. As to Speusippus, Aristotle reports explicitly in [FR. 48] that he had distinguished in kind mathematical number and magnitudes, because each kind has its own principles. Despite this distinction, however, as highlighted in Chapters 1 to 5, Speusippus appears nonetheless to have a unitarian conception of the mathematical realm, comprising in itself both numbers and magnitudes. If this is right, we may now wonder why Xenocrates should not, given that Aristotle is not as explicit when it comes to distinguish them.
- d) Lastly the inclusion of ideal geometrical objects, which I will call Ideal-Geometricals (without attaching to the word any qualification, but just to intend that they are some

⁴⁹⁶ An objection which is usually put forward (see, e.g. Isnardi Parente 1984: 263 and Wizenrieth 2018: 73), also with respect to Xenocrates, is that the formulation ‘εἰδητικὸν μέγεθος’ (parallel to εἰδητικὸν ἀριθμὸν) is never attested. As Isnardi Parente and Wizenrieth underline, the first attestation of the term is by Ps-Alexander (*In Met.* 746, 21: ἕτερα τὰ μαθηματικὰ ἐπίπεδα καὶ στερεὰ καὶ ἕτερα τὰ εἰδητικά), who attests more specifically to ideal planes and solids, and not to magnitudes more generally. However, although a technical terminology for ‘ideal magnitudes’ is not attested, Aristotle does attest in various places of his corpus the existence of ἄτομα μέγεθη. Although in some passages the clear reference for the term is Democritus (e.g. *De Caelo* 307a 22; *Metaph.* 1039 a10), it is certainly interesting that behind other references commentators identify Xenocrates. See, e.g. *Phys.* A 3,187a 1 ἐνιοὶ δ’ ἐνέδοσαν τοῖς λόγοις ἀμφοτέροις, τῷ μὲν ὅτι πάντα ἓν, εἰ τὸ ὄν ἓν σημαίνει, ὅτι ἔστι τὸ μὴ ὄν, τῷ δ’ ἐκ τῆς διχοτομίας, ἄτομα ποιήσαντες μεγέθη. For the unanimous attribution to Xenocrates, see Alex. ap. Simpl. *In Phys.* ad loc., 138,10 (=Fr. 138 IP); Porph. apud Simpl. *In Phys.* ad loc., 140,6-18 (=Fr. 139 IP); Themist. *In Phys.* ad loc., 12,6-17 (=Fr. 140 IP); Philop. *In Phys.* ad loc., 83,19-22 (=Fr. 141 IP); Schol. *In Arist. Phys.* 334a 36ss. Brandis (=Fr. 144 IP); Simpl. *In Phys.* ad loc. 142,16-27 (=fr. 145 IP). For modern scholars inclined to see Xenocrates behind the Aristotelian allusion to ἐνιοὶ, see Gemelli Marciano (2007: 132-137) and Sedley (2009). In particular, Gemelli Marciano underlines how later commentators usually report that Xenocrates’ theories are prompted in response to Zeno’s paradoxes (as the author of *On Indivisible Lines* also does), something which is not the case for Democritus’ atomic theories.

⁴⁹⁷ And this is indeed the conclusion of Robin (1908: 298): ‘Rappelons-nous que Xénocrate avait identifié l’Idéal et le Mathématique, et que d’autre part il considérait les Grandeurs comme des réalités seconds. [...] Il admettait donc que les lignes, les surfaces et les solides étaient indivisibles, et il ne l’admettait pas seulement, comme son maître, pour l’Idée de la Ligne, de la Surface et du Solide, mais aussi pour la ligne, la surface et le solide mathématiques, puisqu’à ses yeux il n’y avait pas lieu de maintenir entre les uns et les autres la distinction qu’avait établie Platon. Pour lui, Idéal et Mathématique c’est tout un; les Grandeurs premières, ce sont des Grandeurs idéales et mathématiques à la fois’, my emphasis.

sort of eidetic objects), serves a second purpose. In the first fragment quoted, Aristotle speaks of a μία φύσις that Forms and τὰ μαθηματικά have in common, but he does not specify what it means to share ‘one nature’. As we have seen, for numbers this means that mathematical number⁴⁹⁸ has been somehow absorbed in its eidetic counterpart, resulting in a specific form of Number, called Form-Number. But as we have also seen, the class (γένος) of mathematical objects is more inclusive and should not be limited to numbers only.

The natural question to ask, then, is: what status does Xenocrates grant geometrical objects? And, as the broad terminology Aristotle uses suggests, can they be taken to be merged with Forms as well? In this specific regard, I believe that investigating what Aristotle means by the ‘one nature’ of *mathematical objects* and Forms can be useful in order to gather more information. Indeed, if *having one nature* implies an identity of the objects considered, we are somehow left with nothing more than the usual position attributed to Xenocrates with respect to Form-Numbers, but the status of geometrical objects will continue to be a mystery. But if *having one nature*, instead, can be more loosely understood, this might lead to more interesting results. If, to some extent, in terms of status, both objects could be treated as sharing structural similarities, this strategy could prove even more fruitful from an interpretive position: if Form-Numbers and their Geometrical counterparts can be treated in the same way, conclusions on the first type of objects can offer us answers about the second. More simply, if, in Xenocrates’ metaphysics, *both* Form-Numbers and Ideal-Geometricals can be treated somehow in the same way due to their shared features, then, inferences about Form-Numbers might be extended to Geometrical-Forms, and *vice versa*. For inasmuch as it could be difficult to define precisely what a Geometrical-Form is, or how it actually works, knowing that it shares an eidetic status with Numbers might help us to understand both. Accordingly, let us assume this hypothesis to be at work and start by investigating what could Aristotle mean by μία φύσις.

6.2 Having one nature

Passages in which the formula μία φύσις occurs can also be found elsewhere in the Aristotelian corpus. Here I will briefly discuss three occurrences,⁴⁹⁹ all referred to theories

⁴⁹⁸ If postulated at all.

⁴⁹⁹ I excluded two occurrences from the *De Caelo* (276a 30; 300a 26), both belonging to broader discussions related to natural movement (κατὰ φύσιν κινεῖται) as opposed to coerced (βίβ) movement and not relevant for our purposes. The same can be said for a passage in book Γ of the *Metaphysics* (1003b 23), referred to the identity of τὸ ὄν and τὸ ἔν, where Platonists are grouped together. I included in my analysis all other occurrences.

of Pre-Socratic thinkers, whose actual works are better attested than those of Xenocrates. It is obviously not my intention to deal with each passage in detail, as this would require a different focus for this section, but only to understand what implications the formula has when projected onto Xenocrates' metaphysical doctrine. Accordingly, the first passage occurs in the *De Anima*.

Ἀναξαγόρας δ' ἔοικε μὲν ἕτερον λέγειν ψυχὴν τε καὶ νοῦν, [...] χρῆται δ' ἀμφοῖν ὡς **μὴ φύσει**, πλὴν ἀρχὴν γε τὸν νοῦν τίθεται μάλιστα πάντων· μόνον γοῦν φησὶν αὐτὸν τῶν ὄντων ἀπλοῦν εἶναι καὶ ἀμιγῆ τε καὶ καθαρὸν. ἀποδίδωσι δ' ἅμφω τῇ αὐτῇ ἀρχῇ, τό τε γινώσκειν καὶ τὸ κινεῖν, λέγων νοῦν κινῆσαι τὸ πᾶν.⁵⁰⁰

Anaxagoras indeed seems to regard soul and mind are different, [...] but he treats them both as **of one nature**, except that he regards mind as above all things the ultimate principle; at any rate, he speaks of it as the only existing thing which is simple, unmixed, and pure. But he assigns both the power of knowing and of moving to the same principle when he says that mind sets everything moving.

In the passage, Aristotle comments on Anaxagoras' theory of the mind and the soul. Indeed, Aristotle openly states that Anaxagoras did indeed *define* (lit. say) the mind and the soul *as two different things* but *treats* them both as *one nature*.⁵⁰¹ What Aristotle appears to be complaining is that Anaxagoras did not sufficiently distinguish between the functions properly belonging to the soul and those peculiar to the Nous.⁵⁰² Moreover, even though the relationship between the two is unclear even for modern scholars, since Nous is said to be alone by itself, and to rule 'as many things as have souls',⁵⁰³ we can nonetheless establish the priority of one (the Nous) over the other (the soul). Whether they were as such or not in Anaxagoras' doctrine, surely Aristotle identifies a subordination of the soul in comparison

⁵⁰⁰ Arist., *De Anima*, 405a 14-20, transl. Hett, modified.

⁵⁰¹ See Lanza (1966: p. 169): 'È molto chiaro che Aristotele deduce la sua identificazione (viz. of Anaxagoras' νοῦς and ψυχή) e non la trova già espresso in A'. For Lanza, the complaint addressed against Anaxagoras is meant to highlight that the latter did not distinguish the final and motive cause'.

⁵⁰² See Curd (2007: 146): 'Anaxagoras has not sufficiently distinguished between soul and Nous, and [...] attributes to Nous motive powers that more properly belong to soul. On Aristotle's view, Anaxagoras should be more discriminating in his accounts of the powers of Nous and should not conflate the separate and fundamentally different powers of thought and sublunary motion'.

⁵⁰³ See testimony B12 Curd (= Simpl., *In Phys.* 156.13ff): 'καὶ ὅσα γε ψυχὴν ἔχει καὶ τὰ μείζω καὶ τὰ ἐλάσσω, πάντων νοῦς κρατεῖ. (but also B11 and B14 Curd). Unfortunately, we have no precise information about what Anaxagoras thought soul to be, or what its difference with Nous amounts to. Interpreters have proposed various accounts for Anaxagoras' soul and combine fragments differently in order to account for its relationship with Nous. One interpretation for Anaxagoras' soul is that when he 'claims that νοῦς controls all things that 'ψυχὴν ἔχει', he does not mean that mind controls a metaphysically distinct entity called a soul, or that it exists 'in' such an entity. Rather, he just means that it controls all things that 'possess life', i.e. different kinds of living things that are amongst Anaxagoras' seeds', Carter (2019:8, n.25); similarly, also Laks (1999). Differently, Lanza (1966: 168) thinks the assimilation of Nous and soul for Anaxagoras to be based on the 'compartecipazione di tutti gli esseri viventi al νοῦς'. Both accounts, if projected onto Aristotle's passage, would establish an even more radical interpretation of the μία φύσις, now applied to Nous and ensouled things. However, whatever Anaxagoras' historical view about the soul was, I take Aristotle to be speaking of two distinct entities: the Nous *and* the soul.

to mind, as he calls the mind the ‘ultimate principle’ (ἀρχήν [...] μάλιστα πάντων).⁵⁰⁴ At the same time, though, Aristotle recognises that the two partly share similar features: even though mind is the ultimate principle of movement, both mind and soul are principles of knowledge and movement (or this seems to be the implication).⁵⁰⁵ Accordingly, although Anaxagoras *says* they are different, he *employs* them as of one nature.

From this first comparison we can conclude that: a) sharing the same nature does not necessarily imply a shared identity of the objects in question. Or, at least, not in the present passage. Two objects can be defined as *different*, but they can be *employed* as of one nature. And what makes Aristotle comment that two objects are treated as of *one nature* is precisely the *common* features they share; for this sharing of features does not sufficiently account for their distinction. Moreover, the passage also tells us b) that things which share the same nature do not necessarily share the same status; for one *may* be primary over the other. Nevertheless, c) the features shared by both can account for their *same nature*.

In order to test these preliminary conclusions, I want to call attention to a second passage, concerned with Empedocles’ treatment of the elements.

ἔτι δὲ τὰ ὡς ἐν ὕλης εἶδει λεγόμενα στοιχεῖα τέτταρα πρῶτος εἶπεν· οὐ μὲν χρῆταί γε τέτταρσιν, ἀλλ’ ὡς δυσὶν οὗσι μόνοις, πυρὶ μὲν καθ’ αὐτό, τοῖς δ’ ἀντικειμένοις ὡς **μῦϛ φύσει**, γῇ τε καὶ ἀέρι καὶ ὕδατι.⁵⁰⁶

Further, he was the first to maintain that the so-called material elements are four - not that he treats them as four, but as two only, treating fire on the one hand by itself, and the elements opposed to it - earth, air, and water- on the other, **as one nature**.

In the passage, Aristotle comments on Empedocles’ treatment of the elements; although Empedocles posited four elements, he treats fire as distinct and opposed to air, water and earth, which feature one nature. One may note here that Aristotle appears to employ the same framework he made use of with respect to Anaxagoras: namely, he points out that items in the philosophical systems he is examining (viz., the elements for Empedocles, soul and Nous for Anaxagoras) have been *formally distinguished* by the philosophers, but that the *similar* way they are *employed* by them in their systems does not account sufficiently for their distinction. An analogous criticism recurs in the *De Generatione et Corruptione* where

⁵⁰⁴ Lanza (1966: 170): ‘ciò che distingue il νοῦς dalla ψυχή è tuttavia quello che Aristotele definisce il suo carattere di ἀρχή, inteso qui in senso piuttosto logico che temporale’.

⁵⁰⁵ So understands Carter (2019: 9): ‘Aristotle’s idea is that, despite Anaxagoras’s suggestions that mind and soul are distinct, nevertheless, he seems to ascribe to both of them the same nature, namely, the power to produce cognition and motion’.

⁵⁰⁶ Arist., *Metaph.* A4, 985a31-985b2, transl. Tredennick.

Aristotle reiterates the claim that Empedocles set all other elements in opposition to fire, ultimately reducing the elements to two.⁵⁰⁷ It is hard to tell what Aristotle is precisely pointing at, since Aristotle concludes that one would be able to detect this tendency from Empedocles' own verses.⁵⁰⁸ But elements, in Empedocles' verses, appear to be described as all having the same status.⁵⁰⁹ What is important for our purposes, however, is that three different elements are, in Aristotle's eyes, treated *as one nature*, while fire isn't. Once again, the equation is established between objects which do differ one from the other (this time *three very different* objects!) but play somehow the same role within a philosopher's doctrine.⁵¹⁰

In this respect, the evidence confirms a) that the formula μία φύσις implies no shared identity of the objects in question. Furthermore, the different treatment of fire (as opposed to the three other elements) tells us b) that one class can even comprise further subdivisions in itself. For we can consider as a higher class that of the elements, comprising all four of them; and then a further subdivision into two classes, one featuring fire, and the other the three other elements. Otherwise, if we are not ready to consider the elements as a whole as one nature (because Aristotle is not explicit about this) we can still consider the one nature of earth, water and air, as having further subdivisions. Indeed, it is clear that although they have similar functions, these elements are certainly not the same thing. To conclude, the passage confirms that the formula does not imply shared identity of the object in question, but it only accounts for features the objects share, notwithstanding their differences.

Lastly, in the third passage Aristotle has the atomists as a target:

Ἀλλὰ μὴν ἄτοπον καὶ εἰ μὴθὲν ὑπάρχει ἄλλ' ἢ μόνον σχῆμα, καὶ εἰ ὑπάρχει, ἔν δὲ μόνον, οἷον τὸ μὲν ψυχρόν⁵¹¹ τὸ δὲ θερμόν· οὐδὲ γὰρ ἂν μία τις εἴη ἢ φύσις αὐτῶν. [...] ἔτι δὲ

⁵⁰⁷ Fr. A36 Inwood (= *De gen. et corr.* 330b19-21): 'Some say right away that they are four, such as Empedocles. But even he reduces these to two; for he sets all the others in opposition to fire (ἐνιοι δ' εὐθὺς τέτταρα λέγουσιν, οἷον Ἐμπεδοκλῆς· *συνάγει δὲ καὶ οὗτος εἰς τὰ δύο*, τῷ γὰρ πυρὶ τᾶλλα πάντα ἀντιτίθῃσιν), translation Inwood.

⁵⁰⁸ Tredennick points at fr. 67 Inwood as an example, where fire is given a prominent role in the development of human bodies.

⁵⁰⁹ See Lloyd (1966: 217) who refers to fr. 25 Inwood: 'For *these things are all equal* and of like age in their birth, but each rules over a different prerogative and each has its own character and they dominate in turn as time circles around' (*ταῦτα γὰρ ἴσα τε πάντα* καὶ ἡλικα γένναν ἔασι / τιμῆς δ' ἄλλης ἄλλο μέδει, πάρα δ' ἦθος ἐκάστω / ἐν δὲ μέρει κρατέουσι περιπλομένοιο χρόνοις), transl. Inwood.

⁵¹⁰ Philoponus, while commenting Aristotle's *De gen. et corr.* 330b19-21, reports that the reason for fire to be divided from the other elements is because it is the only hot element, while others are to be considered cold.

⁵¹¹ On the word ψυχρόν, and on why it should (or should not) be preferred to the word σχληρόν, preserved in the manuscripts of the a-family, there is a significant scholarly debate. The discussion is related to the reasons for the qualities to be appealed to by Aristotle: in the case of σχληρόν, Aristotle would make use of two qualities, hot and hard, accepted by the atomists; in the case of ψυχρόν, Aristotle would rather refer to opposite qualities which, on the basis of their opposition, belong to the same scale. Indeed, σχληρόν is preferred by

πότερον μία πάντων ἡ φύσις ἐκείνων τῶν στερεῶν, ἢ διαφέρει θάτερα τῶν ἐτέρων, ὥσπερ ἂν εἰ τὰ μὲν εἴη πύρινα, τὰ δὲ γήινα τὸν ὄγκον; εἰ μὲν γὰρ μία φύσις ἐστὶν ἀπάντων, τί τὸ χωρίσαν; ἢ διὰ τί οὐ γίνεται ἀνάμεινα ἓν, ὥσπερ ὕδωρ ὕδατος ὅταν θίγῃ.⁵¹²

But further, not only is it absurd that no property except figure should belong to the indivisibles: it is also absurd that, if other properties do belong to them, one only of these additional properties should attach to each - e.g. that this indivisible should be cold and that indivisible hot. For, on that supposition, **their nature would not even be one**. [...] Furthermore, **is the nature** of all these solids **one** for all of them, or do they differ from one another, as if, for example, some of them were fiery and others earthy in their bulk? For **if there is one nature** for all, what is it that separates one from another? Or why do they not become one when they come into contact, just as water does when it touches water?

This last passage differs in many respects from the previous two. First of all, in this context, it is the atomists who claim one and the same nature for atoms, an aspect which Aristotle is not ready to concede easily. Second, in the passage Aristotle focuses precisely on qualitative aspects of the atoms in order to deny their sameness in nature (or, if their nature differs, in order to draw out other contradictions). For this reason, given that Aristotle is arguing against the atomists and attempting to demonstrate that atoms cannot share one nature, the passage might require a certain amount of interpretative effort. For, as Aristotle does not want to concede the point to his antagonists, his position on the topic may be more rigid than observed in the previous passages. However, this should not lead us to deny the results just obtained. Indeed, the first sentences do provide us with more information. Aristotle claims that it is absurd that, for the atomists, no property except figure (σχήμα) belongs to the atoms. Moreover, he claims that it would also be absurd that, in the case where other properties would belong to atoms, only one property should belong to each. It is on this basis that he concludes that their nature would not even be one. Accordingly, the initial part of the passage already provides us with crucial information:

- a) The atomists' claim that atoms are of 'one nature' seems to be grounded on the fact that atoms are indivisible but differentiated between one another according to their figure only.⁵¹³ If this were the case, this would imply once more (i) that 'one nature' does not imply identity, and (ii) that it does not imply identity to a higher extent.

Giardina (2008: 166-167, n. 346), Rashed (2005: 144, n.1) and Migliori (2013, 286-287, n. 46), while Joachim and Hussey (2004: 264) favour ψυχρόν. For the sake of my argument, which qualities are here implied by Aristotle is not crucial. Accordingly, my choice to leave ψυχρόν is related to the translation used (Joachim), and to the textual choices of the translator.

⁵¹² Arist., *De gen. et corr.*, I8, 326a14-17; 29-34, transl. Joachim, slightly modified.

⁵¹³ With this comment, I do not mean to enter into a historical discussion of what the atomists' philosophical tenets were. On the contrary, my only intention here is to attempt an understanding of Aristotle's passage with the purpose of exposing Aristotle's conception of 'one nature' with respect to the atomists.

Indeed, figure would be the feature which prevents atoms from being one and the same thing.

- b) For Aristotle, having the same nature implies sharing the same properties. For, if atoms were granted with different properties, this would prevent them from having the same nature.

The second part of the passage requires more unpacking, specifically because in the subsequent lines it seems that for Aristotle, at least in this context, having one nature necessarily implies the identity of the objects in question. For Aristotle's implication seems to be the following: either atoms differ in nature, and therefore they are qualitatively different (e.g. some of them are earthy, others fiery in their bulk); or if they are of one nature, they are therefore qualitatively indifferent. Moreover, as the example used shows, if they are qualitatively indifferent, there is nothing which satisfies the conditions for their separation; for, as a drop of water which falls in water, they should somehow dissolve once they come into contact. Now, I believe that, in this context, the rigid implication of identity is contingently required by Aristotle's argument and is not conclusive *simpliciter*. The requirement for the differentiation in nature Aristotle appeals to in this passage (i.e. that atoms would differ according to their being earthy or fiery in their bulks) is precisely what is denied in the passage about Empedocles. For, in the Empedocles passage, the qualitative difference between the elements is not a sufficient condition for them not to have one nature, or, better, to be treated as having one nature. On the contrary, in the present passage Aristotle plays precisely on a rigid conception of 'one nature' in order to show that atoms have not been differentiated by the atomists satisfactorily, and hold a middle status in between having one nature and being differentiated by the qualities they hold.

What we can gather from this overview of Aristotle's discussion of previous philosophers is certainly not conclusive. Nevertheless, it still works as a warning against possible prejudices that might lead us to think that having one nature necessarily implies being the same thing. On the contrary, the overview of Aristotle's comment on Presocratic doctrines shows precisely the opposite. *Having one nature* or *being treated as one nature* does not imply necessarily a) that the objects in question are identical, nor b) that the objects under examination are granted with the same ontological status. These conclusions, however provisional as they may be, have important implications for my present investigation of Xenocrates' metaphysical theory. For the sake of clarity, I will now briefly summarise what has been said until now, so as to understand the implications fully.

Aristotle presents Xenocrates as having treated Forms and τὰ μαθηματικά as one nature, or, as having held that Forms and τὰ μαθηματικά are merged into one nature. We have seen that there is some consistency in Aristotelian overviews of the Platonists' positions and, in particular, on Xenocrates': it is usually τὰ μαθηματικά and not numbers exclusively which are considered as having one nature with the Forms.

With this in mind, possible conclusions unfold concerning Xenocrates' metaphysical system:

1) A first option to be excluded is to consider mathematical objects (in general) and Forms as sharing similar features, but not being coincident (namely, two different objects sharing the same features). This first path needs to be rejected on the basis of the extant Aristotelian evidence about Xenocrates. As we have seen, Aristotle's harsh criticism of a peculiar form of Ideal Number supports the hypothesis of a combination of Forms and mathematical objects, rather than of their disjunction. At the same time, though, the equal treatment of τὰ μαθηματικά would imply that geometrical objects should be combined with Forms too.

2) A second option would be to consider Ideal-Geometricals and Form-Numbers as somehow coinciding in one single body, which share features of the Forms. Nevertheless, the overview of Aristotle's passages on Presocratic theories showed that the identity option is not necessarily the case, but that, on the contrary, within the passages examined, identity is not implied *if not* by a rigid conception of the formula μία φύσις.

Accordingly, the most plausible option we are left with is the following:

3) Form-Numbers and Ideal-Geometricals *are not* merged together, even though they are somehow related (whether this relation should be conceived in terms of derivation or not is something I will leave on hold for the moment). On the same basis on which I previously excluded option 1), namely that the equal treatment of τὰ μαθηματικά would imply that geometrical objects as well share the nature of Forms, in this case Ideal-Geometricals and Form-Numbers would share some similar features, at least in their formal treatment. Since I don't have strong reasons to refute option 2) at this stage, I

will assume option 3) as a working hypothesis, to be further tested on the basis of my final results.

At this point, one further clarification is required. Until now, I have concluded very generally that objects sharing a μία φύσις share similar features or characteristics. However, at this stage, it is legitimate to push this conclusion a bit further. In the overview of the formula μία φύσις, I have shown that the formula only accounts for similar features shared by different objects without implying their identity. It is clear, though, that when speaking of mathematical and geometrical objects, these similarities cannot be qualitative. Indeed, this is coherent with Aristotle's passages analysed so far because, both in Anaxagoras' and Empedocles' examples, what justifies Aristotle's statement that the objects share one nature is the similar *role* they play within their system and not their qualitative similarities. Moreover, this seems to be further confirmed by the passage against the atomists, which also supports the same conclusion. The main reason for Aristotle's rigid conception of μία φύσις in the passage is motivated precisely by the fact that if two objects shared the same qualities, they would not be distinguished (or distinguishable), just as a drop of water dissolves when it gets in contact with other water. In the same way, earth, water and air, just as the soul and the mind, cannot be simply considered as qualitatively similar as, for Aristotle, they would otherwise be just the same thing. Accordingly, the similarity between mathematical and geometrical objects within Xenocrates' metaphysical system must be understood as a structural similarity, an aspect which stands in need of clarification.

6.2.1 Interpretative clarifications (fr. 38)

In the previous section, I established that, on the basis of Aristotelian *testimonia*, Form-Numbers and Ideal-Geometrical objects must share similar structural features. I also assumed as a working hypothesis that the two entertain some kind of relationship. Before analysing a claim that is attributed to Xenocrates both in a preserved Arabic translation of a text of Alexander of Aphrodisias and in the pseudo-Aristotelian treatise *On Indivisible Lines*, which could shed light on the precise similarities that Form-Numbers and Ideal-Geometricals do entertain, this section will serve as a preliminary clarification. Although I established that there are structural similarities between Form-Numbers and Ideal-Geometrical objects, there still remains the question concerning the precise referents of these similarities. In order to shed light on the issue, this section is meant as a clarification with the aim to establish limits for my analysis and avoid possible misunderstanding. Indeed, at this stage of my analysis some questions need to be addressed.

- a) Is it possible to establish precisely what Ideal-Geometricals are? Or, in other words, what kind of geometrical objects allow an eidetic consideration, and in what respect they differ from mere geometrical objects?
- b) What is the relation that Ideal-Geometricals entertain with Form-Numbers? Are they to be regarded as derived from these latter?
- c) How should we understand the comparability between Form-Numbers and Ideal-Geometricals? Which of them, precisely, is to be compared with what?

Let us address the three questions in order. To address question a) first, it is hard to establish precisely what kind of geometrical magnitudes are eidetically conceived within Xenocrates' system. As a matter of fact, the problem is the same we face with reference to Form-Numbers; for Aristotle states that mathematical number is the same as Form-Number and, in this respect, it is not easy to establish precisely how mathematical objects *strictu sensu* were accounted for in Xenocrates' world. Accordingly, we need to be cautious with respect to precise identifications. However, as we concluded that the two kind of objects are to be considered structurally similar, we can try to provide at least a suggestion with regard to how they operate and to their limitations. Indeed, in some passages, Aristotle points out that Xenocrates postulated a limited amount of Form-Numbers, which would end with the Decad.⁵¹⁴ I agree with what Crubellier⁵¹⁵ says about this aspect in his commentary: it is hard to understand the limitation by concluding that Xenocrates posited numbers up to ten only; more convincingly, the limitation should be probably understood as confined to Form-Numbers.⁵¹⁶ If we can consider this restriction to be extended to geometrical magnitudes as well,⁵¹⁷ we can suppose that we should think of the first 10 items (or, better, of the first 4, as

⁵¹⁴ See, fr. 47 IP. Another relevant passage is Arist., *Metaph.*, A8 1073a18-22, which is not included in the collection of Xenocrates' fragments, but I believe may be helpful for clarifying the issue at stake. I give here Crubellier's translation (1994: 299): 'Les partisans des idées disent que les idées sont nombres; mais ils parlent des nombres tantôt comme s'ils étaient infinis, tantôt comme s'ils se limitaient à dix – quant à la cause qui déterminerait cette limitation des nombres, ils n'en disent rien qui soit logiquement solide'.

⁵¹⁵ Crubellier (1994: 299-300).

⁵¹⁶ A possible explanation for numbers other than the first 10 may be to consider the 'production' of other numbers by means of participation. Indeed, this would possibly explain Aristotle's assertion that Xenocrates confused mathematical number and Form-Number, with the result that the first is absorbed in the latter. Indeed, if the existence of mathematical number is explained by means of participation, the reproach would possibly make more sense: mathematical number, to a certain extent, would not exist in its own sake, and, obviously, would not possess the same ontological status of Form-Number (being somehow derived and dependent on it).

⁵¹⁷ As fr. 25 IP (=Arist., *Metaph.* M8 1084a37-1084b2) appears to confirm: 'Ἐτι τὰ μεγέθη καὶ ὅσα τοιαῦτα μέχρι ποσοῦς, οἷον ἡ πρώτη γραμμὴ <ῆ> ἄτομος, εἴτα δυάς, εἴτα καὶ τὰτα μέχρι δεκάδος; 'Further, magnitudes and the like extend, they say, as far as a certain quantity; e.g. the first (or) indivisible line, then the two, and so on; these, too extend as far as 10', transl. Ross (1924b: 451) modified. For the addition of <ῆ>, see Ross (1924b, ad loc.). The interpretation of the passage is quite difficult. Isnardi Parente (2012: 277) follows Ross in the translation, and supplies the article: ἡ. But, as Crubellier highlights (1994: 316) the fragment would therefore identify a heterogeneous list of terms (i.e. the first line, the Dyad, things up to 10). Despite disagreeing on the Greek, both Isnardi Parente and Crubellier interpret the second item as the 'geometrical line'. As it will be clearer in the following sections of this chapter, I disagree with the identification for different reasons. In general, I don't see how geometrical magnitudes can be limited to ten if the second item is to be identified with

it happens for the Decad)⁵¹⁸ as laying the conditions for or, at least, allowing the construction of every other geometrical magnitude.⁵¹⁹

In the case of the second question b), concerning the relationship between Ideal-Geometrical and Form-Numbers, information at our disposal is also limited. However, Aristotle seems to suggest at a derivation of Ideal-Geometricals out of Form-Numbers:

[FR. 38] τοῖς δὲ τὰς ιδέας τιθεμένοις τοῦτο μὲν ἐκφεύγει·⁵²⁰ ποιοῦσι γὰρ τὰ μεγέθη ἐκ τῆς ὕλης καὶ ἀριθμοῦ, ἐκ μὲν τῆς δυάδος τὰ μήκη, ἐκ τριάδος δ' ἴσως τὰ ἐπίπεδα, ἐκ δὲ τῆς τετράδος τὰ στερεὰ ἢ καὶ ἐξ ἄλλων ἀριθμῶν· [διαφέρει γὰρ οὐθέν· ἀλλὰ ταῦτά γε πότερον ιδέαι ἔσονται, ἢ τίς ὁ τρόπος αὐτῶν, καὶ τί συμβάλλονται τοῖς οὕσιν; οὐθέν γάρ, ὥσπερ οὐδὲ τὰ μαθηματικά, οὐδὲ ταῦτα συμβάλλεται. ἀλλὰ μὴν οὐδ' ὑπάρχει γε κατ' αὐτῶν οὐθέν θεώρημα, ἐὰν μὴ τις βούληται κινεῖν τὰ μαθηματικά καὶ ποιεῖν ἰδίας τινὰς δόξας. ἔστι δ' οὐ χαλεπὸν ὅποιασιν ὑποθέσεις λαμβάνοντας μακροποιεῖν καὶ συνείρειν.] Οὗτοι μὲν οὖν ταύτη προσγλιχόμενοι ταῖς ιδέαις τὰ μαθηματικά διαμαρτάνουσιν·⁵²¹

Those who posit the Forms do not realise this (difficulty). For they produce magnitudes out of matter and number – lengths from 2, planes from 3, presumably, and solids from 4; or from other numbers, for it makes no difference. But are these (viz. lengths, planes and solids) going to be Forms? And if not, what is their mode of existence and in what do they contribute to the things that are? Just as the mathematical (lengths, planes and solids) contribute nothing, neither these do. Moreover, no theorem applies to them, unless one wants to put mathematical objects into motion and produce some peculiar doctrines. But it is not difficult to spin out at length whatever hypotheses are assumed,

the geometrical (and therefore divisible) line. Indeed, this would open the path for the production of geometrical magnitudes in general and would not constitute a reason to limit their number. Moreover, as it will be clarified in the following pages, I disagree with an interpretation which roots the correspondence between the Dyad and the line in a conception of the line as composed or limited by points (as Crubellier does), and I believe the parallel to rest on different factors (specifically, the individuation of the three dimensions). However, what I believe is valuable in Crubellier's interpretation of the passage is that the second term is considered as an 'equivalent' of the Dyad. In fact, Crubellier adds that: 'certains Platoniciens font du Deux le principe générateur des lignes; et de même le Trois pour les surfaces, le Quatre pour les volumes'.

⁵¹⁸ As it happens with the *tetractys*, where the first four numbers – which, once summed up, make 10 as a result –, represented as a pebble figure, compose a pyramid. As Zhmud points out (2012: 302-303; 2015: 342ff), the *tetractys*, called by Burkert (1972: 72) the 'Pythagorean kernel', cannot be traced back to ancient Pythagoreanism. The first attestation for the word τετρακτύς is in fact late (Aët., *Vetusta placita*, I.3.8) and Aristotle bears no witness to it. However, a similar interpretation of the Decad is attested in verbatim fragment preserved by ps-Iamblichus' *Theologoumena Arithmeticae* (61ff = fr. 122 IP) and, with Zhmud (2015: 342), the tetractys may thus have arisen 'from the tetrad extolled by Speusippus in his work *On Pythagorean Numbers*'.

⁵¹⁹ I will abstain from arithmological consideration of what the parallels should be (although I believe arithmological parallels to lie behind the comparison), because it is hard to establish conclusive criteria for their postulation.

⁵²⁰ For the unusual construction of φεύγειν and its compounds + the dative to describe the object or person who escapes, see Crubellier (1994: 498-499). Accordingly, Crubellier suggests nuancing Ross' (1924b: 47), Tricot's (1953: 819) and Annas' translations ('escape this objection'; 'échappent assurément à cette objection', 'this objection does not touch the people who posit Forms'). He interprets the dative as a 'datif de point de vue' and translates the line as: 'ils n'ont pas conscience de ce < problème >'. My translation follows this analysis.

⁵²¹ = Arist., *Metaph.* N3, 1090b 21-32 (lines 25-30 are excluded in IP), my translation. Cf. Crubellier (1994: 497): 'Et de fait, aux lignes 24-25, Aristote envisage une alternative entre une doctrine qui attribuerait aux objets géométriques le statut d'idées, et une autre possibilité qu'il laisse indéterminée (ἢ τίς ὁ τρόπος αὐτῶν b 24) – place vide qui conviendrait tout à fait à Platon'. Accordingly, the other theory, which attributes to geometrical objects the status of Forms, seems to be ascribable to Xenocrates.

and string them together. These thinkers, then, are quite wrong in attaching mathematical objects to the Forms.

At least two things are to be highlighted about the passage: first of all, Aristotle speaks of the production of τὰ μήκη, *lengths*, out of the Dyad, and he does not speak of lines.⁵²² Indeed, the succession which is stressed by Aristotle is that of lengths, planes and solids (all in the plural), and there is no mention of the line here. Secondly, it is interesting to note that Aristotle, in the following lines, explicitly questions the ontological status of these geometrical objects. If it may be hasty to take the sentence as a confirmation that such objects should be considered as Ideal-Geometricals,⁵²³ as we suggested in section 6.2, it is at least interesting to note that Aristotle says no mathematical theorem applies to them. As we have seen, Aristotle often underscores the fictionality of Xenocrates' Form-Numbers by stressing that they conflict with the rules of mathematics.

6.2.2 What is the comparability between?

Given this background, it is now time to investigate question c), namely, how precisely the comparability between Form-Numbers and Ideal-Geometricals should be understood. In order to determine this, I will build on the results of a famous paper by Pines,⁵²⁴ where an Arabic fragment concerning Xenocrates' metaphysics was translated and presented for the first time. Due to my diverse methodological principles, it will be impossible to evaluate Pines' views conclusively here. In fact, in order to defend the authenticity of the information preserved in the fragment, Pines tests Xenocrates' claim against a wide range of diverse sources and divides the discussion into thematic areas comprising (among others): metaphysics, mathematical theories, and physics. Moreover, the selection of the sources relies on entirely different premises than mine as, on the one hand, many fragments quoted by Pines (although Aristotelian) deal with theories which are difficult to attribute to Xenocrates directly, and mostly address Plato and the Academics as a group; on the other hand, Pines' inclusion of later sources (e.g. Proclus) and commentators of Aristotle (e.g. Themisthius, Simplicius and Aquinas) clearly conflicts with my choice to concentrate on Aristotle alone. For these reasons, I will limit myself to consideration of the section dealing with Xenocrates' mathematical theories only. Nonetheless, it is interesting to note that, despite the methodological departures, Pines' conclusions wholly converge with my current

⁵²² The same happens in fr. 39 IP.

⁵²³ As Crubellier (1994: 499) does too: 'Ce ne sont donc pas des idées, mais ce sont quand même des entités idéales'. Both Crubellier and Cherniss (1945: 484) underline the parallel with another passage in *Metaphysics* A9 (992a 13-18), where Aristotle, in order to show the ambiguity of their status, established a fourth genus (besides those of the Forms, of the intermediates and of the sensibles).

⁵²⁴ Pines (1961).

hypothesis: ‘As can be seen from the passage of Themistius (...) and as is suggested also by other sources, *there is a close correspondence between the geometrical entities and the numbers. It may be assumed that both have a similar structure*’.⁵²⁵ It is on the basis of this assumption, that Pines makes the ‘requisite transposition’ and tries to analyse these structural similarities between Form-Numbers and Ideal-Geometricals. He assumes that the similarity should be understood as follows:

The two units of which the number two is composed, correspond to the two points which constitute a line, and consequently are *eidē*, in accordance with Themistius’ text, also the constituent parts of the other numbers (p. 16) [...]. The three units of which the triad consists do not correspond to the points of which the line consists, but to the three sides of a triangle; and the four units of which a tetrad consists correspond to the four triangles of a pyramid (p. 17)’.⁵²⁶

As Pines himself underscores, Xenocrates’ theory of the incomparability of units in the Dyad, Triad and Tetrad has always been considered strange. Indeed, as I have already emphasised, this precise aspect of Xenocrates’ Form-Numbers drew the criticism of Aristotle, who accused him of having rendered mathematical practices impossible.⁵²⁷ For, according to Aristotle, the ‘conflation’ of mathematical number in Form-Number was in reality its destruction: as the units of the Dyad are not combinable with those of the Triad or of the Tetrad, the basic operations of mathematics are denied. This leads Pines to explain the incomparability of the units of the Dyad with those of the Triad on the basis of a difference of *eidōs*. Just as one would not compare points with lines, the same would hold good for the units of the Dyad and the Triad. It is on the same basis that Pines establishes the comparable items. For those items are not homogeneous, just as much as, according to a difference in *eidōs*, units in the Dyad, Triad, etc. aren’t. However, the way in which points, sides (and therefore lines) and triangles are not homogeneous to one another does not seem to me to correspond to the way in which units of the Dyad, Triad, etc. are not homogeneous. For, despite the incomparability of their units, all form numbers can be ultimately reduced to the same principle of composition: each of them is, indeed, a compound of (inadmissible or incomparable) units. And insofar as *all* Form-Numbers respond to this definition,⁵²⁸ they can also fall under one and the same class: that of Form-Numbers.⁵²⁹ This, however, does not

⁵²⁵ Pines (1961: 16-17).

⁵²⁶ (*Ibid.*, 17)

⁵²⁷ See e.g. fr. 29; 30 (but also 38) IP, where Aristotle accuses Xenocrates of having posited *ἰδίαι ὑποθέσεις*.

⁵²⁸ I am using ‘definition’ loosely here: I mean that all of them seem to be describable in one and the same way.

⁵²⁹ Cf. Crubellier’s (1994: 336) reading of Aristotle’s main question at 1084b32-1085a4 (1994: 336): ‘La difficulté, telle qu’il l’expose, est liée à la notion de dimension : les dimensions sont conceptuellement distinctes l’une de l’autre ; en effet l’introduction d’une nouvelle dimension produit un type d’objet hétérogène,

seem to happen in the case of Ideal-Geometricals. For how can points, lines, planes and solid belong to one and the same class if they cannot be reduced, in the same way Form-Numbers can, to a basic principle for their organisation? A way to solve this problem may be found by appealing to [FR. 38] analysed above, and ground the diversity in *eidos* between points, lines, planes and solids, in the specific Form-Number they are derived out of. However, in the text Aristotle appears to be speaking of one and the same matter, out of which magnitudes are derived. And, at least in this respect, points, lines, planes and solids *must* be reducible to a common root, insofar as all of them are derived from the same matter.⁵³⁰

For in the case of the Dyad, of the Triad and of other Form-Numbers, the unit appears to play the role of an atomic constituent. Thus, units composing different Form-Numbers may be different in kind, and may not be addible to one another,⁵³¹ but for each Form-Number, it is always *a unit* which constitutes the atomic minimum for the compounds. Insofar as units constitute the atomic minimum, the homogeneity of the compounds is guaranteed: they will always be Form-Numbers. However, if we consider points, lines and planes, compounds do not seem to originate in the same way at all. In fact, although Pines' correspondence is understandable on the basis of the transition line-plane-solid, I don't think that there are elements enough to support the parallels. For this reason, I believe the analogy needs to be corrected, before approaching any analysis of the similarity of Form-Numbers and Ideal-Geometricals. Indeed, the first problem arises with regard to the comparison Dyad-line. For even though the equation of the two units in the Dyad with the two points of the line is certainly suggestive, as it respects the correspondence of two units-two points, it is the case that while the composition of solids out of planes and of planes out of lines is well attested,⁵³² nowhere in the fragments can we find any reference which justifies either the composition of the line out of points, nor yet the conception of two points as limits of the line.⁵³³

sans commune mesure avec les objets de dimension ($n - 1$). Mais en même temps l'espace est un et continu. Comment rendre raison à la fois de l'unité de l'espace et de la distinction nécessaire des trois dimensions?'

⁵³⁰ One may also note that matter is usually associated by Aristotle with the Dyad, when he considers the principles (see, e.g. *Metaph.* M5 1087b12-26). While the Dyad, as well as other Form-numbers, here appears to play the role of a formal principle.

⁵³¹ Although the inaddibility of units may also be dependent on the type of compound they accomplish.

⁵³² See, fr. 23; 25 IP but mostly fr. 38 and 39.

⁵³³ The only fragment preserved which, if extrapolated from the context, might raise doubts in this respect is fr. 45 IP (Arist., *De Caelo* III,1, 299a6-11). Indeed, the fragment states that: 'In addition, the composition of solids from planes clearly involves, by the same reasoning, the composition of planes from lines and lines from points (a view according to which a part of a line need not be a line); and this is something which we have already considered in the work on motion, where we concluded that there are no indivisible lines' (ἔπειτα δὴλον ὅτι τοῦ αὐτοῦ λόγου ἐστὶ στερεὰ μὲν ἐξ ἐπιπέδων συγκεῖσθαι, ἐπίπεδα δ' ἐκ γραμμῶν, ταύτας δ' ἐκ στιγμῶν· οὕτω δ' ἐχόντων οὐκ ἀνάγκη τὸ τῆς γραμμῆς μέρος γραμμὴν εἶναι· περὶ δὲ τούτων ἐπέσκεπται πρότερον ἐν τοῖς περὶ κινήσεως λόγοις, ὅτι οὐκ ἔστιν ἀδιαίρετα μῆκη). However, it is clear from the preceding lines (as Simplicius in his commentary on *On the Heavens* (563, 9-20) also makes clear) that it is Aristotle who is building the parallel between the relationship plane-solid (postulated by Xenocrates) and that point-line in order to contradict it; therefore, such a position should not be simply attributed to Xenocrates.

Precisely for this reason it seems that the line needs to be regarded as the spatial minimum, and not the point.⁵³⁴ Moreover, this obtains too from the perspective of what is usually considered Xenocrates' atomism: once again, it is the line which provides the correct parallel for the unit,⁵³⁵ and not points. Just as the atomic constituents of Form-Numbers are units, the minimum in spatial magnitudes seems to be represented by the line. One might add, also, that it was Aristotle himself⁵³⁶ who argued for the impossibility to build a continuum out of points: it is precisely this discussion which might have led Xenocrates to take lines instead of points as constituting the spatial minimum.

Now, since the correspondence between the Dyad and the line, as already apparent in [FR. 38], is attested by Aristotle as well, this will require explanation.⁵³⁷ But before giving a tentative answer, we should keep in mind that the only direct reference to the pyramid is in Themistius' passage and that this reference does not feature parallels anywhere else. On the contrary, what is consistent in Aristotelian *testimonia* is the procession from lines to planes⁵³⁸ or, in other fragments, from *lengths* to planes, and from planes to solid figures *in general*.⁵³⁹ Of course, if one wants to find a correspondence between numbers and Ideal-Geometricals,⁵⁴⁰ the first plane figure will be the triangle, constituted by three lines, and the first solid figure the pyramid (with a triangular base), which would consist of four triangles.⁵⁴¹ But, once again, we have a problem with the line as constituted or limited by

⁵³⁴ Moreover, this seems to be the case even for fr. 25 IP. See *infra*, n. 517 and 537. Isnardi Parente seems to agree on this point (2012: 270ff) and highlights that this was not accepted by Speusippus.

⁵³⁵ See fr. 58 IP (=Schol. in Arist. *De Caelo*, p. 469b 14-21 Brandis).

⁵³⁶ Arist., *De gen. et corr.*, 316a30-5.

⁵³⁷ A hotly debated passage attesting to the correspondence between the line and the Dyad is fr. 25 IP (= *Metaph.* Z11, 1036b12-17). Scholars differ as to what is the right translation of the passage and, consequently, as to its right interpretation. Cf. Cherniss' translation of the passage (1945: 567ff), followed by Isnardi Parente (2012: 263-264): 'some of them, he says, make the dyad αὐτογραμμὴ while others make the idea of line αὐτογραμμὴ'; Ross' translation (1924b: 201-202), 'some make 'two' the line-itself, and others make it (i.e. 'two') the form of the line' is defended by Saffrey (1971: 32ff). On the passage, see also Rashed (2013: 107-108); scholarly interpretations, however, depend not only on the grammar, but on considerations about the whole context and link of referenes. Accordingly, I will postpone the discussion of fr. 25 IP to a different context.

⁵³⁸ Compare, e.g. fr. 23 IP (=Arist., *Metaph.* Z2 1028b24-27): ἔνιοι δὲ τὰ μὲν εἶδη καὶ τοὺς ἀριθμοὺς τὴν αὐτὴν ἔχειν φασὶ φύσιν, τὰ δὲ ἄλλα ἐχόμενα, γραμμὰς καὶ ἐπίπεδα, μέχρι πρὸς τὴν τοῦ οὐρανοῦ οὐσίαν καὶ τὰ αἰσθητά.

⁵³⁹ Compare fr. 38 IP: ποιοῦσι γὰρ τὰ μεγέθη ἐκ τῆς ὕλης καὶ ἀριθμοῦ, ἐκ μὲν τῆς δυνάδους τὰ μήκη, ἐκ τριάδος δ' ἴσως τὰ ἐπίπεδα, ἐκ δὲ τῆς τετράδος τὰ στερεὰ ἢ καὶ ἐξ ἄλλων ἀριθμῶν [...] Οὗτοι μὲν οὖν ταύτη προσγλιχόμενοι ταῖς ιδέαις τὰ μαθηματικά διαμαρτάνουσιν· and 39 IP: ὁμοίως δὲ καὶ περὶ τὰ μήκη καὶ περὶ τὰ ἐπίπεδα καὶ περὶ τὰ στερεά [...].

⁵⁴⁰ As this seems to be the reason also for Pines' identification of the correspondence.

⁵⁴¹ The background for the whole discussion is probably cosmological and has *Timaeus* 53c-56 a in mind, where Plato presents the smallest components of the elements. In the end, it is attested that both Speusippus and Xenocrates had their own interpretation of the *Timaeus* (although the only detail we have regards their interpretation of the Platonic story as pedagogical device, (διδασκαλίας χάριν)) and similar geometrical considerations can be paralleled by ps-Iamblichus' quotation of Speusippus (fr. 122 IP₁).

two points, as this has no other explicit parallel in other *testimonia* on Xenocrates. Accordingly, one possible answer could lie in the Aristotelian terminological shift from γραμμαί to μήκη; this way, one may consider the Dyad as related to length, and, accordingly, the Triad to width and the Tetrad to depth.⁵⁴² In the end, this is also what Themistius himself does⁵⁴³ commenting on Aristotle's *De Anima* and stating that the material is to be found in Xenocrates' book *On Nature*. Now, whether we trust Themistius or not,⁵⁴⁴ I think the parallel is more convincing in at least two respects:

- it provides an explanation for the line, by relating it to the dimension of length rather than to points.
- it finds a justification in Aristotle's language; indeed, instead of speaking of γραμμαί, lines, Aristotle speaks of τὰ μήκη, lengths, before moving on to planes and solids.

Lastly, arithmological comparisons do not necessarily support the argument consistently. Indeed, if one wants to provide an argument against Pines' identification, it can be noted that other arithmological correspondences can be found as well. For instance, just as Form-Numbers do not go on *ad infinitum* but, once we get to the Tetrad, the sum of the numbers lays the conditions for the Decad, in the same way, if we take the line to be the atomic constituent of geometry and we sum up the number of lines in a triangle [the first plane figure] (3) + those in the pyramid with a triangular base [the first solid] (6) + the initial line (1), we would get to the same result (and here we wouldn't have to sum up the indivisible line just like we do with the first unit, as this can be considered the μέτρον, and not a geometrical line).

Accordingly, I take the parallel between Form-Numbers and Ideal-Geometricals to be explained by a different correspondence: just as the unit is, for numbers, the atomic

⁵⁴² I will explain the details of how I take the parallel to work in the next section.

⁵⁴³ See fr. 178 IP (= Themist., *Paraphrasis in Aristotelis De Anima*, 11, 19ff): 'Similarly too in the [books] *On Philosophy* the animal-itself is defined as existing from the form of the one-itself, plus the primary length, breadth and depth', transl. Todd (2013: 26). However, it must be said that the attribution of these lines is highly controversial. See, below, n. 544.

⁵⁴⁴ On this aspect, see the discussion between Saffrey (1955: 37-43) and Cherniss (1959: 75-79). Indeed, in a review of Saffrey's *Le Peri Philosophias d'Aristote et la théorie platonicienne des idées nombres*, Cherniss argues that the passage is to be referred to Xenocrates, rather than to Plato. Todd, in his edition of Themistius' *On Aristotle On the Soul*, agrees with Cherniss (2013: 159, n. 21 and 26).

constituent, the same can be said for the line within geometry. Here we are not yet speaking of specific, diverse geometrical figures,⁵⁴⁵ but of, so to say, their formal conditions.

6.3. The ontological priority of the parts with respects to the whole (fr. 42)

In this last section of this chapter, I shall analyse a claim attributed to Xenocrates in a preserved Arabic translation of a text of Alexander of Aphrodisias, namely, that parts are, by nature, prior to their wholes. Although it would be interesting to analyse the counterpart of this claim, namely, that species stand to their genus just as parts stand to their wholes, this would lead us beyond the scope of the present section.⁵⁴⁶ Thus, my aim for this section is to make sense of this claim within the context of Xenocrates' Form-Numbers and Ideal-Geometricals. In particular, I shall try to understand if, and to what extent, the claim may be equally applied to both objects. But let us deal with the fragment directly:

Alexander says: Xenocrates says: If the relation between a species and a genus is like the relation between a part and a whole, and if a part is anterior and prior to the whole in virtue of a natural priority (for if a part is sublated the whole is sublated, this in view of the fact that no whole will remain if one of its parts is lacking), whereas a part will not be [necessarily] sublated if [its] whole is sublated, (it being possible that certain parts of the whole be annulled whereas others remain) a species is likewise indubitably prior to the genus.

The fragment was translated from Arabic into English in 1961 by Pines⁵⁴⁷ who, in a famous and influential article, presented the text for the first time and demonstrated that it was consistent with other views attributed to Xenocrates. In particular, a similar claim occurs as well in a passage of the Peripatetic *De Lineis Insecabilibus*, which, however, will be impossible to discuss in depth here (both because of the textual problems of the document, and for the complexity of the theories involved). The fragment in question establishes a similarity between the relation parts-whole and the relation species-genus and justifies the

⁵⁴⁵ Just as we are not speaking of mathematical numbers, or, better, of numbers after the Decad, in the case of Form-Numbers.

⁵⁴⁶ I will offer a tentative conclusion of how the parallel between parts and wholes may be understood in the case of the genus-species relationship in footnote 554. The only Aristotelian fragment directly addressing the question is fr. 41 IP (=Arist. *Metaph.* B 3, 998b30- 999a14). Whether the reference in the passage addresses Xenocrates or not is a highly debated issue: e.g. Pines (1961) and Isnardi Parente (2012) consider the fragment to be referring to Xenocrates' doctrine. *Contra*, Bonitz (1849) and Colle (1922) believe the argument to constitute the beginning of the second part of the aporia. Lastly, Berti (2009), together with Tricot (1953), Reale (1997), Ross (1924a) and Madigan (2000) consider the passage to be part of the discussion of the thesis. For more detailed information on scholarly positions concerning the issue, see Berti (2009: 128-129). Given the debated nature of the passage, its analysis would bring us astray from the present purpose.

⁵⁴⁷ Of course, as my knowledge of Arabic is non-existent, my analysis will rely on Pines translation, and on the expert advice of Dr Rigolio, Assistant Lecturer in the Department of Classics and Ancient History at Durham University. The passage, referred to as the *Réfutation de Xénocrate* has been recently translated into French by Marwan Rashed (2004: 50). Part of ps-Aristotle's *De lineis Insecabilibus* (972 b 25-33) has also been translated into French (O'Brien and Rashed 2001). For a more detailed discussion of the text and of its scholarly interpretations, see Verde (2012: 130-183).

second claim on the basis of the first. However, the priority of the parts is explained precisely in the opposite way Aristotle would do and seems somehow counter-intuitive. For, in fact the fragment states that parts are prior because parts would still exist even if the whole is sublated, whereas the opposite would not hold.

If we think of examples, the conclusion keeps on being even more counter-intuitive indeed. If we consider the body as a whole, and the organs or limbs as part of it, my body would still be my body even if I donated a kidney, or if my arm were to be amputated. On the contrary, if my body were to be annulled, it is clear that neither my kidney nor my arm would still exist. But let's try to apply the same to Form-Numbers, considered as wholes, and composed by units, and see if the comparison holds better in a mathematical context. Let us consider, for example, the Tetrad, or number 4. If we were to take out a unit from the Tetrad, it is clear that number 4 would not exist anymore. Indeed, instead of 4 units, we would now have 3. The whole would be destroyed, but its parts wouldn't: we would still have three units, and a different number. At the same time, though, if we were to suppress the Tetrad, rather than one of its units, *other* units would still compose the Triad and the Dyad. Both these steps might be a bit more problematic than this, if we add that the units composing the Tetrad are not the same, or, better, are not combinable with those of the Dyad or of the Triad. Indeed, the comparison would hold *only* if we consider units generically, but not as parts, specifically, of the Dyad, Triad and so on. To reconsider the example of the body I have used before, it is not because there are *other arms* or *other kidneys* in *other bodies* that I can argue that even by annulling my body, parts would keep on existing. The same can be said for the units of the Dyad and the Triad. As the units in the Triad are *the only units* composing the Triad, if the Triad was to be suppressed, *its* units, and therefore, its parts, would be suppressed as well. A better explanation may be found if we take into account numbers after 10, since these indeed arise out of combinations⁵⁴⁸ of the previous numbers. As mentioned earlier, evidence attests that Xenocrates postulated the existence of Form-Numbers until the Decad, and not *ad infinitum*. Accordingly, if we were to take number 12 into consideration, for instance, the example seems to make more sense. By taking out units from number 12 we would indeed have a different number, but if we were to annul number 12 as a whole, this would not imply the elimination of all of its units, which would still compose other numbers. In the end, the fragment does not state that the implication is necessary, but only that *it is possible*. In this perspective, Xenocrates could still argue that the units of the Dyad, Triad, and Tetrad would be annulled, if the whole is,

⁵⁴⁸ As emphasised, (footnote 516) an option would be to consider them to arise out of participation to (some of) the first 10 numbers.

but that this wouldn't happen if we take into account numbers after 10. In this respect, an additional remark is required. The framework that Xenocrates is using here,⁵⁴⁹ follows precisely that which Aristotle underlines when differentiating a $\pi\acute{\alpha}\nu$ and a $\sigma\lambda\omicron\nu$ in chapters 25-27 of *Metaphysics* Δ .⁵⁵⁰ Indeed, Aristotle himself uses number as an example of a $\pi\acute{\alpha}\nu$ and not of a $\sigma\lambda\omicron\nu$ (which would better fit my example of the body), since, as he himself says: 'if a cup is mutilated, it must still be a cup; but the number is no longer the same' (1024 a 16-17). Xenocrates here is then building from Aristotle's own definitions (or, at least, on shared assumptions) to develop and explain his conception of Form-Numbers. Whether this had been a point of discussion between the two philosophers, or whether it was initially part of Aristotle's criticism of Plato, it nevertheless shows that the points of contact between the two are more than Aristotle is ready to admit.

In a mathematical context, then, the example seems to make sense when we consider Form-Numbers as wholes constituted by parts. But what about Ideal-Geometricals: would the relation parts-whole still make sense? Let us take the explanation given by Pines and see if it holds. In the explanation given by Pines, the incommensurability of units from different Form-Numbers is explained on the basis of different correspondences: the two units of the Dyad correspond to two points, the three units of the Triad to the three sides of a triangle, and the four units of the Tetrad to the four triangles of a triangular pyramid. If we try to apply the example to Ideal-Geometricals in the same way we did for numbers, this creates some problems. Indeed, if we take one point from the line, we don't have a line anymore.⁵⁵¹ The same for the triangle: if we take out one side, we have no plane figure anymore, just as if we subtract a triangle from the pyramid we have no possibility of constructing any other solid figure. The problem here is that the incommensurability of the units composing the Dyad, Triad and Tetrad is not built on a reciprocal or parallel consideration of something which plays an analogous role in geometry, but, rather, on the impossibility of comparing them. Indeed, the example is built *a priori* and circularly relies on the impossibility to compare the units in the Dyad, Triad and Tetrad, instead of treating Numbers, and Ideal-Geometricals as *really* sharing structural similarities. To put it simply, Pines' demonstration of the impossibility of comparing units of the Dyad, Triad and Tetrad is justified by reference to the impossibility of comparing points, planes and lines, and not on the basis of common

⁵⁴⁹ It would be interesting to investigate the Arabic terminology in more detail, so to to understand whether the word for 'whole' would better translate $\pi\acute{\alpha}\nu$ or $\sigma\lambda\omicron\nu$, if the Arabic preserves such double possibility.

⁵⁵⁰ Chapters 25-26: (Arist., *Metaph.*, Δ 1023b 26-1024 a 10). It is interesting to note that Aristotle makes use of the same framework also in *De Anima* I 4, 408b 32-409a11 (= corresponding to the first section of fr. 112 IP) when dealing with Xenocrates' definition of the soul.

⁵⁵¹ If we take the points to be the boundaries of the line. Otherwise, according to the same subtraction we could possibly obtain two lines, a line and a point or even another line.

features that Form-Numbers and Ideal-Geometricals would share. But let us now try to take the line as the atomic constituent of geometrical figures and of their dimensions, as I supposed earlier, and test the example once more. If we consider the Dyad, Triad and Tetrad as establishing length, width and depth, the example could make more sense. In particular, we may find a fitting numerical correspondence in the number of *angles* that lines limit within a space. Accordingly, a single line can be considered as the limit of two flat angles, two lines meeting in a point as limiting a plane angle, and three lines meeting at a point as limiting a solid angle.⁵⁵² On this account, one, two or three lines meeting at a point would identify the specific kind of angle required for the construction of lengths, planes and solids. And the minimum number of angles required for a space to be delimited, would in turn justify the numerical parallels. This way we would have a progression of 2, 3, 4 that matches the correspondent Form-Numbers, according to the number of angles that a minimum amount of lines limit in each dimension. In this respect, a single line individuates *two* flat angles, and, in this respect, it can be considered the origin or principle for lengths. In the same way, although the minimum amount of lines required in order to limit a plane figure would then be three, the correspondence would be rather played on the *three* plane angles they limit. For, the triangle is the first plane figure because three plane angles are required in order to delimit the simplest plane figure. However, progressing with the number of plane angles limited, other plane figures could be built. The same in the case of the pyramid built on a triangular base. Although the minimum amount of lines to delimit the simplest solid is six, the correspondence would be rather rooted in the number of angles they limit in a tridimensional space: namely, *four* solid angles (and *not* four *faces*).⁵⁵³ And this because four (solid) angles are the minimum number of angles which can be limited in order to construct a solid. On this account, we would avoid changing the basic constituent every time (point, line, plane), and the line, as limiting flat, plane or solid angles, would play the role of the minimum atomic constituent.

⁵⁵² If this move does not seem immediately legitimate, compare Plato, *Timaeus*, 54a-b: ‘And when four equilateral triangles are combined so that three plane angles meet in a point, they form one solid angle, which comes next in order to the most obtuse of the plane angle. And when four such angles are produced, the first solid figure (viz., the pyramid built on a triangular base) is constructed’, transl. Bury. Note that the construction of the solid angle is not dependent on the construction of the first solid figure, but, rather, the relationship works the other way around: a solid angle is built out of three plane angles meeting in a point. Cf. also Rashed (2013: 110) ‘But a triangle is essentially a figure having three angles, and not three sides. And the angles, as portions of the plane angle, are ratios, hence numbers. Thus, in Plato’s ontology, we have to claim that the numbers produce the surfaces and not that the numbers produce the lines which would in turn produce the surfaces’. For the line as a limit for plane angles, see Rashed (2013b: 225, n.3). On the absence of a ‘geometry of the line’ see Rashed (2010: 103-109) and Vuillemin (2001: 103ff).

⁵⁵³ Note here that if one wants to find arithmological comparisons the number of lines required in total would amount to 10 (1+3+6).

If one desires to speculate further, we could possibly apply to Ideal-Geometricals the same restriction applied to Form-Numbers: namely, just as in the case of the Dyad, Triad and Tetrad wholes are not suppressable without eliminating their parts, this may be the case for the (first) line, as well as for the first plane (triangle) and solid (pyramid built on a triangular base). However, if we take lines to constitute the parts of plane and solid figures, this may make more sense. Each plane or solid figure is delimited by a specific number of lines, which delimit their (plane or solid) internal angles. By suppressing one line, any figure as a whole is eliminated as well, but not its parts, which would still be sufficient to build a different (plane or solid) figure, possibly by combining solid and plane angles. In this respect, just as by subtracting units from numbers this does not leave us without the possibility to build *different numbers*, the same may be valid in the case of geometrical figures.

Conclusions

At this point, it is worth wrapping up and provide some final remarks. In section 6.1, I have shown that Aristotelian overviews of the metaphysical position of Plato, Speusippus and Xenocrates are consistent in saying that the latter has posited one nature for Forms and τὰ μαθηματικά. If Aristotle testifies to a peculiar form of eidetic number, namely, Form-Number, the consistency in speaking of τὰ μαθηματικά *in general*, and not of Numbers *exclusively*, led me to a parallel consideration of Form-Numbers and of what I have called Ideal-Geometricals. In section 6.2, I have examined three passages present in the Aristotelian *corpus* which shed light on the formula ‘μία φύσις’. It turned out that the formula does not imply the identity of the objects in question, but, rather, only accounts for their similar features. On the basis of the analysis undertaken and of the coherence with the Aristotelian passages, I have assumed that, in the context of Xenocrates’ metaphysics, the formula accounts for structural similarities shared by Form-Numbers and Ideal-Geometricals. This assumption revealed to be meaningful once examined in light of another Xenocratean claim, i.e. that parts are prior to the whole. Indeed, the examples provided in section 6.3 showed that, just as the unit is the atomic constituent of Form-Numbers, if we consider the line to be the spatial minimum in geometry, examples are coherent both in demonstrating a structural similarity of mathematics and geometry and in view of the demonstration of the priority of their parts with respect to the wholes.⁵⁵⁴

⁵⁵⁴ As emphasised, in order for a whole to be eliminated if a part is removed, the whole must accomplish its unity as a πᾶν, and not as a ὅλον. But how can we make sense of this requirement with respect to the relationship genus-species? I will provide a tentative explanation here. Let us take the genus ‘animal’, for instance. In order to fulfil the requirement, the definition of such genus will necessarily be extensional (following Menn, unpublished, Ib3:12). The genus will be constituted by each and every of its species, or, in other words, by the

CHAPTER SEVEN: THE SOUL

In the previous chapter I concluded that the Aristotelian formula ‘μὴ αὐτὸ φύσις’ reveals a similarity in terms of structure which underlies Xenocrates’ consideration of Form-Numbers and Ideal-Geometricals: just as the unit can be considered the atomic constituent of Form-Numbers, the line constitutes the spatial minimum in geometry. Philosophically speaking, this ontological and parallel articulation of Form-Numbers and Ideal-Geometricals is not limited to an exposition of their structural analogy; on the contrary the analogy reveals itself to be meaningful because: (i) it allows a parallel consideration of these objects; and (ii) it favours a *gradual passage* from numbers to spatiality.

In this respect, Xenocrates’ metaphysical world already goes beyond that of Speusippus in the attempt to recover more coherently a fundamental aspect of Plato’s theory (at least from Xenocrates’ perspective): namely, Forms. Speusippus’ rejection of the Forms had indeed led him to develop an episodic system with different principles for every level. If the self-sustainability at each level of beings had allowed Speusippus to grant independence not only to their objects, but also to the different kinds of knowledge for their pursuit, his philosophical solutions caused disruption in the structure of his world. But as both Aristotle and Theophrastus underline, disruption in the structure implies also a great dose of disconnection, and, accordingly, a lack of overall coherence in the system. Xenocrates seems, at least, to be much more careful in this respect. For he appears to embrace Aristotle’s criticism in view of a more continuous, and therefore, coherent system, which takes into account Aristotle’s own conclusions about other topics as well (as, for instance, the impossibility of building a continuum out of points, or the differentiation between a πᾶν and a ὅλον).

enumeration of *all* of its species (man, horse, etc.). Given the framework of an extensional conception of the genus, if one of the species is sublated (e.g. horse), the genus will not exist anymore: for the genus will be no more constituted by all of its species but will lack one. And, for this reason, the species is by nature prior to the genus, and not the other way around. Moreover, this background also accounts for why, if the genus is eliminated, the same would not happen to its species. Indeed, we said that in order for the genus ‘animal’ to obtain, we need that all its species are enumerated. For eliminating one species (or part) would not imply, as a consequence, that all other species (or parts) are eliminated as well; however, it would certainly imply the elimination of the genus (i.e. the whole).

The aim of the present chapter is to show that this framework also offers interpretative advantages with respect to Xenocrates' doctrine of the soul. For what is immediately clear from Xenocrates' definition of the soul as a 'self-moving number' is that a third condition (besides those accounted so far) obtains: that of movement. Through detailed explanation of his definition of the soul, I will argue that Xenocrates establishes the grounds for an ontologically justified intermediate position for the soul, as well as for continuity within the system of sensible objects.⁵⁵⁵

7.1 The definition of the soul: methodological choices for the analysis

Attempting to reconstruct Xenocrates' doctrine of the soul by relying on the evidence preserved by Aristotle exclusively is no easy task. As a matter of fact, Aristotle does not even mention Xenocrates explicitly in his reports,⁵⁵⁶ and only preserves a definition of the soul which he does not ascribe to any philosopher specifically. Such a definition of the soul as a 'self-moving number' is in fact acknowledged as Xenocratean only by the Hellenistic doxographic tradition, which traces the connection back to Pythagoras himself.⁵⁵⁷ Moreover, Aristotle does not even seem to be clear in indicating what Xenocrates' definition amounts to. For the interpretation of Xenocrates' doctrine of the soul proved to be very challenging also for ancient commentators, who attempted an explanation of the formula in various ways. For instance, Alexander of Aphrodisias explains that the soul circumscribes (περιορίζει) the body, thus granting the body with the power of movement;⁵⁵⁸ alternatively, John Philoponus illustrates that the definition appeals to two different notions: those of number and movement, in the attempt to harmonise the Platonic and Pythagorean tradition together. Besides the fascinating history of the interpretation of Xenocrates' definition of the soul, the six Aristotelian passages on Xenocrates' doctrine can be approximately divided into two

⁵⁵⁵ With respect to this 'continuous' consideration of the world, it is interesting to compare fr. 20 IP (= Theophrastus, *Metaph.*, 6a23-6b9). In her collection (2012: 259-261), Isnardi Parente provides a long commentary on the passage and of the various scholarly interpretations propounded in particular with respect to the last sentence ('but of the heavens and the rest they make no further mention whatsoever. And likewise neither do those around Speusippus nor anyone of the others except Xenocrates; for he does somehow provide everything about the universe, alike sensibles, intelligibles, mathematical, and, what is more, the divine [things]' (αἰσθητὰ καὶ νοητὰ καὶ μαθηματικά καὶ ἔτι δὴ τὰ θεῖα), transl. Gutas (2010: 127)). Isnardi Parente considers the passage as problematic both because it does not square with Sextus' report about Xenocrates (=fr. 2 IP) and because it does not square with Aristotle's account of Xenocrates, according to which Forms and numbers are identified. Although it may be difficult to find precise reference to the various levels, it is nonetheless interesting that Theophrastus identifies a progression of different domains. For an attempt to square Theophrastus', Sextus' and Proclus' testimonia and understand the relationship between different levels of being, see Horky (2013b: 701ff specifically).

⁵⁵⁶ For obvious reasons, it will not be part of the aim of the present chapter neither to discuss the attribution of the definition, nor to doubt about the authenticity of the doctrines preserved in *De Anima* 404b (=fr. 85 IP) as really belonging to Xenocrates. On the same passage, see Auffret (2015).

⁵⁵⁷ See, e.g. fr. 90 IP (= Aetius, *Placita* IV, 2, 1) and 91 (= Theodoretus, *Graecarum affectionum curatio*, V, 17) IP.

⁵⁵⁸ See, fr. 94 IP (= Alexander of Aphrodisias, *In Arist. Topica*, 493 21-2; 494, 1; 11-4).

types: doxographic and exemplificatory, or so to say, methodological. Indeed, apart from the two doxographic passages preserved in the *De Anima*, a book in which we would actually expect to find the soul as the main topic of the discussion, information about Xenocrates' doctrine of the soul is also preserved in a passage of the *Posterior Analytics*, as well as in three passages of the *Topics*. These two treatises obviously do not have as an objective a detailed treatment of the soul and rather use Xenocrates' definition as an example of wrong methodology. The information preserved in such contexts is completely decontextualised and aims at showing that Xenocrates' definition is inaccurate according to the logical rules propounded by Aristotle. In this respect, these passages would appear to preserve material which is less subject to philosophical interpretation and, consequently, more accurate. Precisely for this reason, I will analyse those fragments first, in the attempt to expose Xenocrates' rationale for his definition of the soul. My strategy will be as follows. In sections 7.2 to 7.3, I will analyse fr. 86-89 IP. The aim is to understand whether the rationale for Xenocrates' definition is in accordance with the framework provided in the introduction; subsequently, section 7.4 will consider the two Aristotelian descriptions of Xenocrates' soul preserved in the *De Anima* so to test the results obtained within the bigger picture of Aristotle's longer reports.

7.2 Xenocrates' definition of the soul: self-movement as explanatory for living (fr. 86)

The first mention of Xenocrates' definition of the soul occurs in the *Posterior Analytics*, and, more specifically, in the context of Aristotle's discussion of whether a syllogism or demonstration of the essence is possible or not (τοῦ δὲ τί ἐστὶ πότερον ἔστι συλλογισμὸς καὶ ἀπόδειξις ἢ οὐκ ἔστι).⁵⁵⁹ In book II of *A.Po*,⁵⁶⁰ Aristotle establishes that 'a demonstration that an attribute P belongs to a subject S standardly assumes as the middle term what S or P is (i.e. the essence)'.⁵⁶¹ To make it simpler, Aristotle's objective is to test the possibility of constructing a syllogism, or a demonstration, that a feature A belongs definitionally to all C.⁵⁶² The relevant syllogism would be of the following kind:

⁵⁵⁹ Arist. *A.Po* II, 4. Aristotle's answer to the question is a negative one.

⁵⁶⁰ On the two models of demonstration in Aristotle's *Posterior Analytics*, see Bronstein (2016: 48-50). For the analysis of Aristotle's passage, as well as for the reconstruction of Xenocrates' argument, I will rely on Charles (2001: 1080-186) as well as Barnes (1994: 209-210) and Bronstein (2016: 144-147).

⁵⁶¹ I am following Bronstein here (2016 :146), since Aristotle's sentence literally states that that 'a syllogism proves something about something through a middle term' (ὁ μὲν γὰρ συλλογισμὸς τί κατὰ τινὸς δεικνύουσι διὰ τοῦ μέσου) (91a14-15).

⁵⁶² I am following Charles closely (2001: 180ff) for the reconstruction of Aristotle's argument in the first part of *A.Po* I2.4.

A Φ def all B⁵⁶³

B Φ def all C

A Φ def all C

Let us take A to be ‘two-footed animal’, and C to be ‘men’ for illustration. Accordingly, the syllogism could be schematised as follows:

Two-footed animal Φ def all B

B Φ def all men

Two-footed animal Φ def all men

The problem Aristotle raises is that such a syllogism either begs the question or is not demonstrative of the essence. For if B (namely, the middle term) provides a definition of ‘man’, then the syllogism begs the question because it assumes the essence as a premise rather than demonstrating it. Alternatively, if B does not provide a definition of ‘man’, then the syllogism fails to demonstrate that ‘two-footed animal’ belongs essentially to the definition of man.⁵⁶⁴ Now, the reason why I am drawing the attention on this background is because Xenocrates’ definition is mentioned right after this discussion, as an example of those people who attempted to prove the essence of something (in the case of Xenocrates, of the soul) through conversion (διὰ τοῦ ἀντιστρέφειν). I report the whole passage here:

[FR. 86] οἱ μὲν οὖν διὰ τοῦ ἀντιστρέφειν δεικνύοντες τί ἐστὶ ψυχὴ, ἢ τί ἐστὶν ἄνθρωπος ἢ ἄλλο ὅτιοῦν τῶν ὄντων, τὸ ἐξ ἀρχῆς αἰτοῦνται, οἷον εἴ τις ἀξιόσσειε ψυχὴν εἶναι τὸ αὐτὸ αὐτῷ αἴτιον τοῦ ζῆν, τοῦτο δ’ ἀριθμὸν αὐτὸν αὐτὸν κινουῦντα· ἀνάγκη γὰρ αἰτῆσαι τὴν ψυχὴν ὅπερ ἀριθμὸν εἶναι αὐτὸν αὐτὸν κινουῦντα, οὕτως ὡς τὸ αὐτὸ ὄν.⁵⁶⁵

Those who try to prove the essence of ‘soul’ or ‘man’ or anything else by conversion⁵⁶⁶ are guilty of *petitio principii*. E.g., suppose that somebody asserts that soul is that which

⁵⁶³ With Charles (2001: 180, n. 316): by ‘ Φ def’ I intend ‘belongs definitionally to’. Moreover, Aristotle provides restrictions for the argument. In seeking a definition for C, Aristotle is looking for something which should be (i) possessed by all and only Cs and (ii) be included in the essence of C (Charles 2001: 182). It is in regard to point (i) that I believe we should understand Aristotle’s statement that some people demonstrate ‘διὰ τοῦ ἀντιστρέφειν’. On this aspect, see footnote 566 below.

⁵⁶⁴ See Bronstein (2016: 147).

⁵⁶⁵ (=Arist., *A.Po.*, 2.4, 91a36-91b2), transl. Tredennick slightly modified.

⁵⁶⁶ In providing the requirements for the syllogism, Aristotle states that ‘ταῦτα (viz. A and C) δ’ ἀνάγκη ἀντιστρέφειν’ (*A.Po.*, II, 2.4, 91a17), namely, that the terms must be convertible. This requirement ensures that A and C (and therefore the middle-term B) are co-extensive. And this seems to be confirmed by Aristotle’s conclusion that the soul is essentially a self-moving number ‘οὕτως ὡς τὸ αὐτὸ ὄν’, i.e. ‘in the sense of being identical with it’. For the second example Aristotle presents right after Xenocrates’ is that in which A is the essence of C and A is predicated of all B as genus of species (e.g. (A) animal is predicated of all men). In that sense, A is obviously not co-extensive with C, and the conclusion will not provide a demonstration which is peculiar to the species, but one that holds for the genus only. In that case, Aristotle concludes: ‘because it is true that all humanity is a species of animality, just as it is true that every man is an animal; but not in the sense that they are *identical* (οὐχ οὕτως ὥστε ἐν εἶναι)’ (*A.Po.* 91b4 -7, transl. Tredennick). Accordingly, it would seem that Xenocrates is seeking a definition of the soul through a syllogism of the kind provided at the

is the cause of its own living, and that this is a self-moving number; he is necessarily postulating that soul is essentially a self-moving number in the sense of being identical with it.

Now, Xenocrates' argument has been reconstructed similarly by Charles and by Barnes, who attempted to provide a formulation of his thesis in a syllogistic form. Let us address Charles' reconstruction first. According to Charles,⁵⁶⁷ Xenocrates may have argued that:

Being a self-moving number Φ def to being explanatory of life

Being explanatory for living Φ def all soul⁵⁶⁸

Being a self-moving number Φ def soul

Charles' reconstruction squares precisely with the scheme provided above. So presented, Xenocrates' argument provides a demonstration of the essence of the soul (i.e. a demonstration that the soul is a self-moving number); yet, since B already offers an essential feature of the soul (i.e. being explanatory of life), the syllogism begs the question because it assumes the essence rather than demonstrating it. Despite the persuasive framework, however, the reconstruction is less satisfactory from an interpretative point of view.

Indeed, the order in which the claims are arranged is unconvincing. For if the order of the premises is indifferent insofar as the syllogism is constructed (since the middle term at stake i.e., being explanatory of life, remains the same) another question is whether the order makes some difference insofar as a reconstruction of Xenocrates' argument is concerned. And I believe that, in view of a charitable interpretation of Xenocrates' argument, the order does make a huge difference. Indeed, one thing is the heuristic context in which the demonstration is developed, and another the expository framework that the syllogism provides. In the end, the claim that the soul is cause of its own living is one that most of the Greek philosophical tradition would have easily accepted; on the contrary, a premise such as 'being a self-moving number Φ def to being explanatory of living' provides an explanation of the *reason* for Xenocrates' definition, rather than a claim which is epistemically plausible or one that is assumed in order to be clarified. Accordingly, with respect to Xenocrates' argument, what

beginning of the section (in which terms A and C are convertible, and therefore co-extensive), and accordingly, doing something which Aristotle has established as impossible. Thus, in the case of Xenocrates, terms A and C that he provides would actually be co-extensive, but precisely for this reason the syllogism would beg the question and not be demonstrative of the essence, because the essence is assumed instead of being demonstrated. Barnes (1993: 2010) would generally agree with my interpretation. If this is not taken to be an *ad hominem* argument, 'the argument is 'through conversion' in the weak sense of using a convertible premiss'. Differently, Charles (2001: 192) takes what he calls the 'Unity condition' to be referred to the unity of the *definiens*.

⁵⁶⁷ Charles (2001: 185-186).

⁵⁶⁸ Charles' formulation is: 'explanatory of life'.

Charles presents as the starting point of the demonstration is quite an odd premise: if Xenocrates were actually attempting to demonstrate the essence of the soul, it would be weird that the first premise chosen is the least intuitively acceptable.⁵⁶⁹ This aspect is even more puzzling if considered within the Aristotelian framework. For Aristotle establishes that a demonstration is a deduction from premises which are, among other requirements, primary, immediate, prior to and more familiar than the conclusion.⁵⁷⁰ Given this background, Aristotle would hardly consider a premise such as: ‘Being a self-moving number Φ def to being explanatory of living’ as a satisfactory premise *at all*. After all, Aristotle accuses Xenocrates of constructing a fallacious demonstration *and not* of offering an implausible one. In this respect, we may take Aristotle’s silence as confirming that Xenocrates’ mistake is to be found elsewhere, and that a different reconstruction is possible.

A second aspect in need of elucidation, is to clarify which allegations Aristotle addresses against Xenocrates precisely. A problem Aristotle raises is that Xenocrates, in attempting to demonstrate the essence of the soul, assumes that the soul is just what a number itself is (τὴν ψυχὴν ὅπερ ἀριθμὸν εἶναι αὐτὸν αὐτὸν κινεῶντα). In the reconstruction provided by Charles, this aspect is, once again, well accounted for within the framework of the syllogism, but possibly less convincing from an interpretative perspective. Indeed, the assumption that *the soul* is just what a number is, results only from the conclusion, and is, so to say, *derived* from the premises, rather than assumed as one of them. For the demonstration is rooted in an equivalence between ‘being a self-moving number’ and ‘being explanatory for living’ (premise 1). Accordingly, the stipulation that the soul is a number (conclusion) is obtained through the assumption that ‘being explanatory for living’ belongs definitionally to the soul (premise 2). However, from an interpretative point of view, to say that Xenocrates’ assumed that the soul is just what a number is, might have a different significance. I will leave this aspect to the side for a moment, so as to analyse Barnes’ reconstruction⁵⁷¹ briefly and return to the issues raised with more information. Barnes’ reconstruction, with respect to the order of the premises, seems to offer a more natural reading. Hence:

The soul is what is explanatory for living
What is explanatory of life is self-moving number
 The soul is a self-moving number.

⁵⁶⁹ Although in this account the second premise is prior to and explanatory of ‘the soul being a self-moving number’. On this aspect, see Charles (2001: 189-191).

⁵⁷⁰ This is Aristotle’s overall objective in *A.Po* I.

⁵⁷¹ Barnes (1993: 209).

In this case, although the middle term remains the same of the previous reconstruction (i.e. ‘being explanatory of life’), the syllogism provides a more intuitively acceptable (as well as epistemically plausible) first premise and goes on to demonstrate that the soul is a self-moving number. The syllogism proposed is valuable also insofar as the arrangement of the premises respects the order in which Aristotle himself presents them. Indeed, the first information Aristotle provides is precisely that the soul is cause of its own living (τὸ αὐτὸ αὐτῷ αἴτιον τοῦ ζῆν); accordingly, this will be premise 1. Secondly, Aristotle introduces Xenocrates’ definition. By exposing the essence of the soul, the definition will need to be demonstrated, and therefore it will constitute the conclusion of the proof (Conclusion). The rest (premise 2) can be easily obtained by combining the scheme provided at the beginning (AaB; BaC; AaC) with the information just gathered. It must be said that even in this case, the assumption that *the soul* is just what *a number* is only results from the conclusion. In any case, the reconstruction is again coherent with the syllogistic framework introduced at the beginning of the section; for (i) the proof aims at a demonstration of the essence of the soul (i.e. being a self-moving number); but also (ii) the proof begs the question because B (being explanatory of life) assumes an essential feature of the soul rather than demonstrating it. By contrast with Charles’ reconstruction, Barnes provides an opportunity to understand why Aristotle believes Xenocrates’ demonstration to be proved ‘through conversion’. For the conclusion and the first premise can be inverted without compromising the demonstration, or,⁵⁷² in other words, *not only* the conclusion, but *also* premise 1 is taken to be demonstrable in exactly same way. Precisely for this reason, however, the proof also begs the question: for the essence of the soul, as in the first reconstruction, is provided in B already, thus anticipating the conclusion.

Hence, both reconstructions are accurate insofar as the Aristotelian framework is concerned. But what about Xenocrates’ argument? Is it possible to find a more charitable explanation for his claims?

Even from Aristotle’s own wording of the sentence, it does not seem that the argument was actually presented in a syllogistic form. For Aristotle says ‘ἀνάγκη αἰτῆσαι τὴν ψυχὴν ὅπερ ἀριθμὸν εἶναι αὐτὸν αὐτὸν κινουῦντα’, thus implying that it *would* be necessary to

⁵⁷² And therefore, A and C are co-extensive. This is how commentators understand the text. Indeed, they ‘suppose that Xenocrates attempted to prove the first premise of his argument from the conclusion and the conversion of the second premiss’ (Barnes 1993: 209-210). Another option is to suppose a ‘weaker sense of using a convertible premiss’. This way, ‘when Aristotle says ‘it is necessary to postulate that X is Y in the sense of being the same thing’ he means ‘it is necessary to postulate that X is Z, where Z = Y’ i.e. Xenocrates must postulate that the soul is a number inasmuch as he postulates that the soul is explanatory of its own life and being explanatory of one’s own life is (on his account) one and the same thing as being a self-moving number’ (2003: 210).

assume the former, and not that Xenocrates actually did so. As previously pointed out, this sentence also provides a suggestion that, in restoring Xenocrates' argument, one should justify the assumption that *the soul* is just what *a number* is. Before providing a different interpretive option, it is worth emphasising that both reconstructions identify the *aim* of Xenocrates' argument with a demonstration of his definition. Thus, in both syllogisms the conclusion corresponds to Xenocrates' definition of the soul. However, is this necessarily the case? Let us try to work with the elements provided by Aristotle. From Aristotle's text we can gather that Xenocrates maintained that:

- a) The soul is that which is cause of its own living.
- b) The soul is a self-moving number.

Statement a) provides an epistemically plausible claim about the function of the soul; statement b) provides Xenocrates' definition of the soul. In the context of a demonstration such as that in which Aristotle presents the claims, it is crucial to find a connection between the two. Thus, it is not an accident that such connection is found by the interpreters precisely in the middle term: 'being explanatory for living'. Accordingly, the linking sentence would provide a connection between Xenocrates' definition and the claim that the soul is the cause of its own living. But what if claim b), and thus Xenocrates' definition of the soul, is assumed by Xenocrates, precisely in order to show the significance of his demonstration? This way, rather than a demonstration of his definition, Xenocrates would put forward the reasons for providing it. To put it more schematically, the line of thought would be the following:

Being explanatory of life pertains to the soul
The soul is a self-moving number
 Being explanatory of living pertains to being a self-moving number

With this I do not mean that Xenocrates actually presented his argument by means of a syllogistic scheme. On the contrary, the syllogistic scheme provided by Aristotle offers an occasion to think about Xenocrates' definition, and, more specifically, consider the reasons for advancing it. Indeed, if we understand the argument in this way, Xenocrates would still have to explain how being a self-moving number can account for being explanatory of living, but his argument would nonetheless expose the reasons for his definition. Namely, the soul is defined as a 'self-moving number' in order to provide an explanation for the soul's

capacity to produce life.⁵⁷³ This part of the argument, in the end, is precisely that which is the most in need of proof, since it provides the link for the definition to be applicable to the soul. But, at least in the framework I provided at the beginning of the chapter, such a link would be very reasonable. For, if Xenocrates actually conceived of his world in a continuous way, at this stage his universe would feature Form-Numbers in the first place, and Ideal-Geometricals in the second, accounting for the derivation of dimensionality. But by definition, mathematical objects are not liable to change. And change is precisely the condition which is missing in order for life to arise.⁵⁷⁴ By characterising the soul as a self-moving number, however, this last condition would not only add up, but it would also add up consistently with the rest of Xenocrates' ontological schemes, as I shall argue below.

First of all, the soul is a number. In this respect, the soul is a mathematical object, and it is conceived as ontologically continuous with the metaphysical realm, i.e. with Form-Numbers and Ideal-Geometricals. But the soul is a *moving* number. This capacity for movement should not be underestimated; for, in the framework provided movement allows the consideration of another crucial condition: change. With this I obviously do not mean that movement grants the soul with physical extension nor that Xenocrates' definition concedes that the soul is changeable.⁵⁷⁵ On the contrary: for the soul is in fact a number, and the consideration of the soul as a number prevents it from corporeal and physical consideration. What I want to suggest, however, is that movement offers the possibility to Xenocrates of being used *both* as a distinctive feature of the soul (insofar as it self-moving and insofar as it is applied to a non-sensible object) *and* as a condition to differentiate between the soul (and therefore living beings) and *sensible* bodies. For, if Xenocrates' world were continuous, we would expect to find sensible bodies precisely after the soul. And, as we have shown, different levels are distinguished by appeal to specific *differentia*. In this respect, the soul's capacity of *self-movement* is both what distinguishes it from other

⁵⁷³ In her collection of the fragments, Isnardi Parente (2012: 296) keeps the commentary on fr. 86 quite short (7 lines in total). However, she briefly underlines that there is a 'profonda ed essenziale affinità fra anima e vita: se l'anima è causa di movimento, κίνησις, essa è causa anche di vita a se stessa'.

⁵⁷⁴ And, possibly, it is also the condition for solids to become *physical* solids. If we think of Speusippus' definition of time as 'τὸ ἐν κινήσει ποσόν' (=fr. 93 IP1), namely, a quantity in movement, this interpretation would maybe acquire more plausibility. In this respect, it is interesting to note that, precisely the example of time as something which moves is quoted by Aristotle in *Topics*, III, 6, 120a39-120b4 (=fr. 87 IP), before mentioning Xenocrates' definition of the soul. The fragment is not remarkably useful for our purposes, as Aristotle's intention is to refute Xenocrates' definition by analysing the species of number and showing that the soul belongs to none of them ('for if the soul is neither odd nor even, clearly it is not a number'). However, although the mention of time might not be relevant for our purposes, it is interesting insofar as Aristotle's insistence on movement is constant in all other passages about Xenocrates.

⁵⁷⁵ Although this may be considered as a possibility, if we distinguish different meanings of *change*. Moreover, these are precisely the consequences Aristotle will draw in his report in the *De Anima*.

mathematical entities, and what allows the *body* with its capacity to move. And it is plausible to concede that body is not to be considered a number as well.

Now, let us think from an Aristotelian perspective, where motion can be characterized minimally by *change* in substance, quality, quantity or place.⁵⁷⁶ If we grant Xenocrates *at least* to be working with shared assumptions with Aristotle, by providing bodies with the liability to movement⁵⁷⁷ (n.b., not *self*-movement), then there are interpretative advantages. For Xenocrates is able to offer a theory of continuity of sensible bodies within his ontological system. If movement can be characterised as change in substance, quality, quantity or place, we are thereby provided with a condition which allows a differentiation of metaphysical and sensible substances, and, at the same time, grants the latter with their peculiar characteristics: physical extension, change, alteration and transience. But would this framework imply that every body which is liable to movement, is also alive? No, it wouldn't. Because the soul is defined as a *self*-moving number, and the capacity to self-move, as we have seen, is introduced in order to account for life specifically.

If we take this Aristotelian background to be at work, Xenocrates is able to offer a detailed and coherent explanation of his world, whose realities gradually deploy by appeal to specific *differentiae*. And the appeal to *differentiae* guarantees both the continuity of the objects under examination as well as their peculiarity. Of course, the recourse to such an explanation shows, one more time, the ontological concerns guiding Xenocrates' philosophical commitments. Nevertheless, the explanation reveals that his definition of the soul has a clear philosophical aim, as it provides as explanation of the soul's status within the system.

7.3 Xenocrates' definition of the soul: a middle status (frr. 88-89)⁵⁷⁸

⁵⁷⁶ Arist., *Phys.* 3.1, 200b33-34.

⁵⁷⁷ Or, at minimum, with the liability to motion.

⁵⁷⁸ In the previous section, I concluded that Xenocrates' definition of the soul acquires clarity and significance if understood within the larger picture of his continuous philosophical system. However, I voluntarily avoided addressing a fundamental question related to the application of this definition: is the definition meant to belong to the individual soul *only*, as Aristotle's reports seems to suggest? Or, rather, is it intended to be applied to world-soul? Or, again, does it comprise both as Dillon (2003: 121-123) seems to conclude on the basis of a mirror-relationship between the two? Such questions are, given my methodological commitments, very hard to address at all. Indeed, all information regarding the individual soul as a *daimon* and Xenocrates' demonology more generally is preserved in later authors. These sources are extremely hard to disentangle both with respect to the material they used and with respect to the attribution of the doctrines to Xenocrates. The same can be said about the reports on how Xenocrates conceived of his cosmos, or the arrangement of divinities within it. Although a conclusive answer cannot be offered in this context, I believe this definition of the soul to be perfectly fitting within Xenocrates' cosmology, and especially so if taken to be the result of his continuous interpretation of the world. For a discussion of Xenocrates' demonology, see Dörrie (1967), Schibli (1993) and Dillon (2003). For a detailed analysis of the sources and the different kinds of souls as associated to geometrical figures, see Horky (2013b: 697-702 specifically). As Horky's chart shows (2013b: 701) there seems to be a triadic structure underlying Xenocrates' epistemology, ontology and psychology (as detectable from the reports

The next two passages I want to briefly consider come from books IV and VI of the *Topics*. The two of them, do, in different ways, address the topic of the definition of the soul, by focusing in particular on the aspect of movement. This may not come as a surprise, since, in the end, the definition of the soul as ‘self-moving mover’ is already present in Plato⁵⁷⁹ and criticised by Aristotle.⁵⁸⁰ However, as emphasised, I believe movement to represent the crucial link between Xenocrates’ metaphysical world and the sensible one, insofar as it accounts for life to arise, as well as for sensible objects to be gradually introduced (and differentiated) within the system. Accordingly, I will here report Aristotle’s passages within their context, so to test whether this conclusion can be equally gathered from these texts.

[FR. 88] Ἐτι ὅταν ὄντος καὶ τῷ εἶδει καὶ τῷ γένει ἐναντίου τὸ βέλτιον τῶν ἐναντίων εἰς τὸ χεῖρον γένος θῇ· [...] καὶ εἰ τοῦ αὐτοῦ εἶδους ὁμοίως πρὸς ἅμφω ἔχοντος εἰς τὸ χεῖρον καὶ μὴ εἰς τὸ βέλτιον γένος ἔθηκεν, οἷον τὴν ψυχὴν ὅπερ κίνησιν ἢ κινούμενον. ὁμοίως γὰρ ἢ αὐτὴ στατική καὶ κινητική δοκεῖ εἶναι, ὥστ’ εἰ βέλτιον ἢ στάσις, εἰς τοῦτο ἔδει τὸ γένος θεῖναι.⁵⁸¹

Further, there is the case when, both the species and the genus having a contrary, your opponent places the better of the contrary species in the worse genus [...]. You must also see whether, when the same species is similarly related to both, your opponent has placed it in the worse and not in the better genus, saying, for example, that the ‘soul’ is ‘a kind of motion’ or ‘a moving thing.’ For the same soul is generally regarded as being in like manner a principle of rest and a principle of motion; so that, if rest is better, it ought to have been placed in this as its genus.

[FR. 89] Ἡ εἰ ἔστι μὲν ἴδιον τὸ προσκείμενον, ἀφαιρεθέντος δὲ τούτου καὶ ὁ λοιπὸς λόγος ἰδιός ἐστι καὶ δηλοῖ τὴν οὐσίαν. οἷον ἐν τῷ τοῦ ἀνθρώπου λόγῳ τὸ ἐπιστήμης δεκτικὸν προστεθὲν περιέργον· καὶ γὰρ ἀφαιρεθέντος τούτου ὁ λοιπὸς λόγος ἴδιος καὶ δηλοῖ τὴν οὐσίαν. ἀπλῶς δ’ εἰπεῖν, ἅπαν περιέργον οὐ ἀφαιρεθέντος τὸ λοιπὸν δῆλον ποιεῖ τὸ ὀριζόμενον. τοιοῦτος δὲ καὶ ὁ τῆς ψυχῆς ὅρος, εἰ ἀριθμὸς αὐτὸς αὐτὸν κινῶν ἐστίν· καὶ γὰρ τὸ αὐτὸ αὐτὸ κινεῖν ψυχὴν, καθάπερ Πλάτων ὥρισται. ἢ ἴδιον μὲν ἐστὶ τὸ εἰρημένον, οὐ δηλοῖ δὲ τὴν οὐσίαν ἀφαιρεθέντος τοῦ ἀριθμοῦ.⁵⁸²

Or, again, you must see whether, though the addition is peculiar to the subject, yet its removal still leaves the rest of the description peculiar to the subject and demonstrates the essence. For example, in the description of ‘man’ the addition of ‘receptive of knowledge’ is superfluous; for, if it is removed, the rest of the description is still peculiar and demonstrates the essence. In a word, anything is superfluous the removal of which leaves a clear statement of the subject of the definition. The definition of the soul, if stated as a ‘number moving itself,’ is a case in point; for the soul is ‘that which moves itself,’ according to Plato’s definition. Or, perhaps, the statement, though it is peculiar to the subject, does not demonstrate the essence if the word ‘number’ is removed.

of Sext. Emp. (fr. 83 IP); Theophr. (*Metaph.* 4b19–5a5) and Procl. (fr. 223 IP) respectively), which is also reflected in his arrangement of the world. For a recent appraisal of Early Academic cosmological theories and of methodological closeness they establish with geometrical practices, see Bénatouil (2017).

⁵⁷⁹ See, Plat., *Phdr.* 245c-e; *Leg.*, 895e-896a. For an analysis of the passages which takes into account both definitions, see Cherniss (1964: 9-13).

⁵⁸⁰ Arist., *Topics* 120b21-35.

⁵⁸¹ (=Arist., *Top.* 127b8-19), transl. Forster.

⁵⁸² (=Arist., *Top.* 140a34-140b7) transl. Forster.

I take the two passages to be complementary. Both of them are in fact directed against Xenocrates' definition of the soul and aim at demonstrating that *the definition itself* is erroneous; on the one hand, Aristotle claims that the definition is wrong because it places the soul in the wrong genus;⁵⁸³ on the other hand, the definition, taken as a statement of the genus and the specific *differentia*, is wrong insofar as it states an aspect of the soul which is superfluous, and, therefore, it does not state its essence. However, the passages are complementary also insofar as [FR. 87] takes into account movement while [FR. 88] concentrates on the fact that the soul is defined as a number. What seems essential to Aristotle in both fragments, and especially in [FR. 87], is that the soul is characterised as a self-mover. However, as he himself admits, by removing 'number' from the definition, we may not have a statement of the essence of the soul, as defined by Xenocrates. Accordingly, [FR. 87] reveals that both specifications are *equally* essential and necessary for Xenocrates' definition.⁵⁸⁴ For as I suggested in the previous section, it is the characterisation of the soul as a number *and* its capacity to self-move which prevent it from comparisons with bodies. This, once more, may be taken as a confirmation of the fact that the soul, in order to play a middle role, needs to be described *both* according to features of the metaphysical level, *and* features belonging to the sensible world. For the soul is *neither* a metaphysical entity, nor a sensible object, but is, to some extent, both. In the end, a number which moves itself can be viewed as almost a paradox. For how can a number be in motion or be the cause of motion, and in what sense can the soul resemble a number? In this respect, Xenocrates is possibly attempting to fix one problem inherent to Speusippus' theory. Although Aristotle does not preserve much about Speusippus' theory of the soul, the separation of Speusippus' ontological levels might have constituted an obstacle in view of the acquisition of knowledge. If the soul constituted a different and separate level from the mathematical realm and that of the sensibles, and if each level is heterogeneous and independent, nothing in Speusippus' system could ensure the possibility that such levels could be known. On the contrary, the continuity of Xenocrates' system accounts precisely for this aspect. By describing the soul with features of both the metaphysical realm and the sensible one, Xenocrates is also guaranteeing the possibility of its middle epistemic status.

⁵⁸³ In the comment of fr. 88, Isnardi Parente says that, possibly, the specification of a double aspect of the soul as source of movement as well as of rest was the result of Xenocrates' interpretation of the *Timaeus* (as Cherniss (1964: 10-11) claims, relying on Plut., *De animae procreat.* 1012ff). However, it seems to me that, at least from fr. 88, it may be Aristotle as well who makes explicit the consequences of defining the soul in relation to movement, and that such an interpretation is not necessary.

⁵⁸⁴ This, perhaps, also explains why Aristotle phrases Xenocrates' definition with a double αὐτόν in the passage previously analysed (ἀριθμὸν εἶναι αὐτὸν αὐτὸν κινουῦντα). The soul is, indeed, in the first place a number, and, more specifically, a number which moves itself.

7.4 Xenocrates' definition of the soul: Aristotle's testimony in the *De Anima* (fr. 85 and 112)

Despite the mentions of Xenocrates' definition of the soul in the *Posterior Analytics* and in the *Topics*, the most extended account of Xenocrates' doctrine of the soul is to be found in Aristotle's *De Anima* (=fr. 85 and 112). First of all, Aristotle presents Xenocrates' definition within the philosophical tradition he believes to be inscribed in:

[FR.85] Ἐπεὶ δὲ καὶ κινητικὸν ἐδόκει ἡ ψυχὴ εἶναι καὶ γνωριστικόν, οὕτως ἔνιοι συνέπλεξαν⁵⁸⁵ ἐξ ἀμφοῖν, ἀποφηνάμενοι τὴν ψυχὴν ἀριθμὸν κινουμένην⁵⁸⁶ ἑαυτόν.

But since the soul appears to be both a principle of movement and capable of knowledge, some thinkers have constructed it from both, defining the soul as a number moving itself.

In the passage Aristotle lists Xenocrates among those philosophers who granted the soul both with the capacity for movement and knowledge. In section 7.2, I argued that the qualification of 'self-moving' needs to be understood as an explanation for living; in addition, the consideration of the soul as a mathematical object was meant to allow a differentiation between simple bodies and ensouled ones. For although sensible bodies (differently than geometrical solids) are also liable to movement (and therefore change), they cannot be the cause of their own movement. In section 7.3 I suggested that such a definition was prompted so as to grant the possibility for the soul to know, a possibility perhaps denied by Speusippus' disruptive model. In this passage, Aristotle confirms this suggestion: the definition of the soul is meant to account for movement as well as for the production of knowledge. In this respect, the characterisation of the soul as a mathematical object should be understood as an assurance for its capacity to know. If we assume once more that the inhomogeneity of Speusippus' world did constitute a problem in this respect, the fact that the soul is conceived as a number exposes a second aim. Not only the soul is conceived as a number in order to prevent its physical change but also, and most of all, the soul is conceived as a number because its ontological affinity with the metaphysical world grants it with the possibility to understand it. Nonetheless, Aristotle describes Xenocrates' theory as the most

⁵⁸⁵ Polansky (2007: 76) draws the attention to the verb, noting that it may be considered as particularly fitting, giving the importance Plato granted to weaving things together in the *Statesman* and in the *Sophist*.

⁵⁸⁶ Arist., *De Anima*, 404b 27-28, transl. Hett modified. The authenticity of the lines preceding the passage has been highly debated (see Isnardi Parente (1979: 153ff); (1996: 146ff); *contra*, see Tarán (1961: 459-460)) especially with regard to the attribution of the thesis either to Xenocrates (Cherniss (1964: 565ff).) or Speusippus (IP₁ (1960: 316ff) and IP₂ (2005: 48-51).) Accordingly, I will not take the preceding lines into account for the present inquiry. It is worth mentioning, however, that in the preceding and controversial lines Aristotle mentions that the living universe (τὸ ζῶον) 'is derived from the idea of the One and from the primary length, breadth and depth; and everything else in the same way' (ἐξ αὐτῆς τῆς τοῦ ἑνὸς ἰδέας καὶ τοῦ πρώτου μήκους καὶ πλάτους καὶ βάθους, τὰ δ' ἄλλα ὁμοιοτρόπως, transl. Hett).

unreasonable of all.⁵⁸⁷ The passage is quite long, and it brings up many of the issues raised so far. In order to facilitate the reading, I break down the content into six sections, so to analyse the material step by step.⁵⁸⁸

1. [number and movement: incompatible concepts]

[FR. 112] Πολὺ δὲ τῶν εἰρημένων ἀλογώτατον τὸ λέγειν ἀριθμὸν εἶναι τὴν ψυχὴν κινουμένην ἑαυτὸν· ὑπάρχει γὰρ αὐτοῖς ἀδύνατα· πρῶτα μὲν τὰ ἐκ τοῦ κινεῖσθαι συμβαίνοντα, ἰδίᾳ δ' ἐκ τοῦ λέγειν αὐτὴν ἀριθμὸν· πῶς γὰρ χρή νοῆσαι μονάδα κινουμένην, καὶ ὑπὸ τίνος, καὶ πῶς, ἀμερῇ καὶ ἀδιάφορον οὖσαν; εἰ γὰρ ἐστὶ κινήσις καὶ κινήτης, διαφέρειν δεῖ.⁵⁸⁹

But of all the unreasonable theories about the soul the most unreasonable is that which calls the soul a number which moves itself. In this theory there are inherent impossibilities, first those which are implied by the theory of the soul's being moved, and also special ones which follow from calling the soul a number. For how can one conceive of a unit moving? by what is it moved, and in what way, being as it is without parts or differences? For if it can cause and suffer movement it must have differences.

The main objective of Aristotle's passage is to underline the short circuit that the notion of number and that of movement imply once they are considered together or combined.⁵⁹⁰ Xenocrates' theory is the most unreasonable of all because it is constructed out of two incompatible notions. In this respect, it is liable to criticisms addressed to each of them, as well as to both. In particular, the conception of a number capable of movement is something which could have indeed be charged with paradoxicality, in particular according to Platonists' premises. But Aristotle's compact questions illustrate various possible inconsistencies, aimed at showing that the concept of number and that of movement are conflicting at different levels.

On a general level, Aristotle points out that mathematical objects (such as Xenocrates' Form-Numbers) are in principle not liable to movement and change.⁵⁹¹ Indeed, the first question Aristotle asks (πῶς γὰρ χρή νοῆσαι μονάδα κινουμένην) stresses precisely that a

⁵⁸⁷ The whole passage corresponds to Arist., *De Anima*, 408b 32-409 a11; 409a16-30), transl. Hett.

⁵⁸⁸ The numbers are not meant to break down the passage into its arguments, but to offer a better occasion to discuss the relevant topics.

⁵⁸⁹ Arist., *De Anima*, 408b32- 409a4, transl. Hett.

⁵⁹⁰ Moreover, the passage is preceded by Aristotle's rejection of the theory of the soul as *harmonia*. This view has affinities with the theory of the soul as a self-moving number in various respects. Unfortunately, for the sake of the present purpose, it is impossible to analyse such similarities in detail. On this topic, see Polansky (2007: 103-122), who summarises the similarities as follows: 'Number moving itself thus is quite figurative. And if Number actually means some relationship or logos of the Forms, then this position can be seen as a major refinement of the *harmonia* view. Whereas *harmonia* has soul as a logos of bodily components, but a logos rather functionless, the self-moving Number conception makes the soul a logos that is more substantial and functional' (2007: 108). In my account, I take the fact that the soul is conceived as a number to work in continuity with what I have concluded about Form-Numbers in Chapter 6.

⁵⁹¹ The fact that mathematical objects are not subject to change and generation can be gathered from Aristotelian passages in M and N, which address Plato and the Academics as a group. See, e.g. Arist., *Metaph.* N5. 1092a21-1092a24; 1092a29-1092b5, analysed in section 3.3.

combination of the two notions is even difficult *to conceive* (νοῆσαι): a unit in motion is something which creates problems even at a theoretical stage.

2. [the soul is a unit: simple objects cannot self-move]

However, Aristotle asks specifically how it is possible for *a unit* (μονάς) to move. Accordingly, the general criticism entails a second and related one, at a more particular level: if the soul is a unit, and a unit is without parts, the soul cannot be a principle of movement. Indeed, according to Aristotelian premises nothing simple can be set to motion in its own right, but it can move only co-incidentally.⁵⁹² And the formulation of the question implies the equation of the soul with a *single* unit. Although the equation might sound odd, Aristotle seems to imply precisely this step.⁵⁹³ For the simplicity of a unit necessarily implies that the cause of its movement is determined by something else. One thing to underline is that the implication that the soul is a unit does not seem to follow necessarily from the previous claim that the soul is conceived of as a number. In the end, for Aristotle himself a number is indeed a *compound* of units and not a single unit.⁵⁹⁴

3. [the soul is a compound of units: therefore it cannot be uniform]

This second option is presented right afterwards. Aristotle points out that, alternatively, if the soul is indeed in motion, then it is necessary for the soul to hold internal differences. This alternative offers a consideration of the soul as a number in the sense of a compound of units. I take the criticism to imply that if the soul is a self-moving number in the sense of a compound of units, it should have in itself a part which is moved and a part which is the cause of movement; thus, its units would differ the one from the others insofar as one (or some) moves and others are moved.

⁵⁹² Barbotin (1966: 101), Polansky (2007: 119) Shields (2010: 146) and Shiffman (2011: 41, n.41) refer to *Physics* 240b8-9. However, as Polansky notes (ivi) ‘this argumentation vitally depends upon Aristotle’s rejection of the possibility of self-movers that are partless, and this depends upon his rejection of motion for incorporeal beings. Could partless incorporeal beings be in motion, other than accidentally, they might be self-movers with no distinction of mover and moved, and hence all the units or aspects of the unit would be self-movers’.

⁵⁹³ This is what Shields (2016: 146 and 148) takes it to mean. The same equation of the soul with a unit occurs later in the text, and this entails once again the criticism related to the impossibility of self-movement for something which is partless.

⁵⁹⁴ In *Metaph.* Δ 219b3-5, when he is defining the meaning of ‘time’, Aristotle highlights that number has two meanings. Accordingly, time is a number in ‘the sense of what is counted or countable, not in the sense of what we count with’ (219b5-9; the same point is stated at 220b8-9, cf. Annas 1975: 97). And this interchangeable way of treating ‘measure’ and ‘number’ is frequent in Aristotle’s treatment of time. In this respect, the claim can be illuminating in order to understand why Aristotle establishes a parallel between ‘number’ and ‘unit’ in the passage under analysis. If the soul is a number in the sense of a ‘measure’, then the conclusion that the soul, as a number, can also be considered as a unit, could be less biased than expected. For also in *Metaph.* I 1-3, ‘one’ is a unit of measurement (see, e.g. 1053b28ff). Nevertheless, it is hard to establish the impact of such a notion when projected onto the soul. In what sense the soul could indeed be considered a measure? For a more detailed analysis of this relation, specifically with respect to Aristotle’s treatment of time, see Annas (1975).

Accordingly, the first part of Aristotle's criticism presents us first with a general problem, the theoretical impossibility to conceive of a number in motion. Although this notion is impossible in principle, Aristotle provides us with two interpretative options for its meaning. The consideration of the soul as a number is in fact presented in two alternatives: either the soul is a unit, and thus it is partless, and it cannot move itself, or it is a compound of units, and therefore, in order to move, it needs to be internally differentiated. It is hard to imagine what Xenocrates would have to say on this point. Clearly, the combination of number and movement does not represent, for him, a theoretical impossibility. It is plausible to suppose that he would reject the identification of the soul with one unit only. In the end, if we think of immediate comparisons for the claim that the soul is a number, none of Form-Numbers seems to be composed by one unit only⁵⁹⁵ and, rather, they accomplish a higher kind of unity, as a result of the fact that they are wholes composed by parts.

4. *[the movement of the units in the soul imply the latter's spatial extension]*

[FR. 112] ἔτι δ' ἐπεὶ φασὶ κινηθεῖσαν γραμμὴν ἐπίπεδον ποιεῖν, στιγμὴν δὲ γραμμὴν, καὶ αἱ τῶν μονάδων κινήσεις γραμμαι ἔσονται⁵⁹⁶

Again, since they say that a moving line describes a surface, and a moving point a line, the movements of the soul's units will be lines.

In the following part of the criticism, Aristotle introduces the theory of the flow (ῥύσις), to prepare the ground for the following discussion on the spatial location of the soul. According to the theory of the flow, by exerting movement on a point this latter produces a line, and the same happens with the line which produces a surface. It is clear, however, that Aristotle is being tendentious on this point. For, as highlighted in Chapter 6, the theory according to which a line can be resolved into (or derived from) points is nowhere to be found in Aristotle's *testimonia* about Xenocrates. And Aristotle is aware that Xenocrates rejects the principle that a line can be resolved into points. Indeed, at the end of the passage he exploits precisely this rejection to expose other inconsistencies of Xenocrates' theory. In fact, the whole passage ends with a rhetorical question ('how is it possible to separate the

⁵⁹⁵ Unless one wants to consider the One (and the Dyad) as Form-Number(s) as well. This point is actually quite difficult to determine. Indeed, on the one hand, if the One and the Dyad are to be considered Form-Numbers, it is not clear in what respect they should be considered principles, if not only for the fact that they are the first of Form-Numbers. On the other hand, if the One and the Dyad are not to be considered Form-Numbers, this does not square with the fact that, among Form-Numbers, Aristotle very often mentions the Dyad.

⁵⁹⁶ Arist., *De Anima*, 409a4-6, transl. Hett.

points and free them from the bodies, if lines cannot be resolved into points?) which confirms our suppositions.

5. [if the soul is in motion: its units will be in some place]

[FR. 112] ἡ γὰρ στιγμή μονάς ἐστι θέσιν ἔχουσα· ὁ δ' ἀριθμὸς τῆς ψυχῆς ἤδη πού ἐστι καὶ θέσιν ἔχει.⁵⁹⁷

For a point is a unit having position; and the number of the soul is *ipso facto* somewhere and has position.

Aristotle equates units with points in order to carry on with his attacks. The conditions for the discussion of space, however, were established already in the previous step through the introduction of the flow theory. Indeed, the rationale for the equation between units and point is, I believe, justified by the soul's capacity to move. Aristotle says that a point is a unit having a position; but if a point, when movement is exerted onto it, produces lines, the same would happen once the units of the soul are set in motion: at minimum, they occupy a position, and therefore they can be equated to points. Alternatively, we might take the discussion to be generated just supposing that the soul is in a body and that the soul is a number in motion, although I find this option more difficult to justify.

This way, the soul occupies a place by reason of its movement. Nowhere before had Aristotle raised the question of the spatial location of the soul. On the one hand, the topic is introduced in order to prepare for the comparison Aristotle will establish between Xenocrates' doctrine and Democritus': by equating units and points Aristotle has a parallel whereby to compare Democritus' atoms. On the other hand, we might wonder whether the criticism raises a point which is relevant also beyond the comparison. Accordingly: does the soul occupy a place? If so, is it to be considered as spatially extended? The fact that the soul is characterised as a number would perhaps suggest a negative answer to the question. Yet, the addition of movement clearly creates some friction. In general, I take it to be possible that the soul has some sort of spatial extension, whether this is explained by appeal to its movement or by some other aspects. For, if Xenocrates' world, as I have been arguing, is rooted in a continuous conception, dimensionality, and hence space, would have already been produced at the level Ideal-Geometricals. However, we do not have to necessarily suppose that the spatiality produced at a metaphysical level corresponds to physical spatiality.⁵⁹⁸ For, we have supposed that precisely the fact that the soul is a number prevents

⁵⁹⁷ Arist., *De Anima*, 409a6-8, transl. Hett.

⁵⁹⁸ The problem of spatial extension would require an adequate and separate discussion, which needs to be postponed to a different context. However, a differentiation between a physical space, occupied by bodies, and

it from being liable to change,⁵⁹⁹ as happens with sensible bodies. The same could be supposed with respect to its dimensionality.

6. [the soul is not a *πᾶν*]

[FR. 112] ἔτι δ' ἀριθμοῦ μὲν εἰς ἀφελή τις ἀριθμὸν ἢ μονάδα, λείπεται ἄλλος ἀριθμός· τὰ δὲ φυτὰ καὶ τῶν ζώων πολλὰ διαιρούμενα ζῆ, καὶ δοκεῖ τὴν αὐτὴν ψυχὴν ἔχειν τῷ εἶδει. δόξειε δ' ἂν οὐθὲν διαφέρειν μονάδας λέγειν ἢ σωματῖα μικρά· [...].⁶⁰⁰

Now, if one subtracts a number or unit from a number, another number is left. But plants and many animals continue to live even when divided and seem to retain in these fragments a soul specifically the same as before. It would seem to make no difference whether we speak of units or of minute particles [...].

The passage is sometimes intended by scholars as pointing out a difference in species.⁶⁰¹ Indeed, if one number is subtracted from another, what remains is a different number, thus different in species.⁶⁰² Obviously, this does not happen once we bisect plants or animals;⁶⁰³ for when a plant or an animal is bisected the two souls resulting out of the division remain in the same species. However, the criticism also touches an aspect which we have already encountered with Form-Numbers and Ideal-Geometricals: the conception of wholes (either *πᾶν* or *ὅλον*) composed by parts.

In the previous passages, Aristotle has progressively introduced the issue of location of the soul. First, with the introduction of flow theory, movement of the soul was used to motivate a dimensional consideration of its units. Such a dimensional consideration of the units prepared their equation with points, differing from the former by means of their 'position'.⁶⁰⁴ Now, the distribution of the soul's units in the body is exploited in order to discuss physical division. If the units of the soul are distributed in the body, then when the

a metaphysical or geometrical one is not necessarily an anachronistic conviction. In the end, already for the atomists void was the result a geometrical and logical conclusion. For a Platonic example, see e.g. Sattler (2012), who distinguishes between geometrical and physical space and takes dimensionality to be a requirement for the former.

⁵⁹⁹ Or, as a minimum condition, to the same kind of change sensible objects undergo, and which implies their perishment.

⁶⁰⁰ Arist., *De Anima*, 409a 8-12, transl. Hett.

⁶⁰¹ See, Polansky (2007: 120); Shields (2010: 148).

⁶⁰² And this, as we have seen in the previous chapter, is right. Form-Numbers differ in species the one from the other. On the topic of the dissection of plants and animals in relation to the soul, see Bos (2007).

⁶⁰³ Ross (1955: 297), Polansky (2007: 120) and Shields (2010: 148) refer to Aristotle's experiments of bisection, and to parallel *loci* where the example is provided. On Aristotle's dialectical use of bisection, see Sprague (1989). For a recent evaluation of the topic of bisection in its connection to the impulse for movement, see Mittelmann (2010).

⁶⁰⁴ This passage allows Aristotle to establish a parallel between Xenocrates' and Democritus' theories of the soul, which I have excluded from the text as not directly relevant to our analysis. However, it is noteworthy that the comparison between atomists and Academics is not an isolated case (as to Aristotle's use of atomic theories against Speusippus, see, *infra*, Chapter 3). Indeed, it seems that Aristotle sometimes exploits the same theoretical schemes in order to refute both philosophical schools.

body undergoes a division, the soul is also mutilated. Given this background, it is understandable why Aristotle here points out that by removing a unit from a number, another number is left. The consequence is that if the soul is a number, then, physical division would produce, at least, a different number, and, consequently, a different soul. The underlying assumptions supporting the conclusion appear to be a) that units of the soul are distributed in the body; b) that the number of the soul is a precise number; i.e. the soul is the sum of its units c) that the subtraction of parts of the bodies imply the subtraction of units from the soul, therefore compromising its unity and its functionality. Indeed, Aristotle argues that plants or animals would continue to live, even when divided. This conclusion appears to be supported by the following and complementary assumptions (i) that the soul as a whole pervades every part of the body (i.e. the soul is not distributed); (ii) that the soul, insofar as it is not connoted quantitatively, does not change by means of subtraction; or, in other words, the soul is not the sum of its parts; and (iii) that the subtraction of parts of the body does not compromise the unity and functionality of the soul. More simply, Aristotle seems to point out that Xenocrates' soul, insofar as it is a number, accomplishes a kind of unity which is that of a $\pi\alpha\nu$. On the contrary, the unity accomplished by the soul seems to be, in Aristotle's perspective, closer to that of a $\delta\lambda\omicron\nu$.⁶⁰⁵ On this account, however, the soul's unity depends not only on (i) the relationship established between the parts and the whole; but also, and most of all, on (ii) the behaviour of its parts as well. For the parts of the soul should be homogeneous to the rest so that, once divided, they can both constitute a unity. In this respect, the whole should be more than the sum of its parts, and its unity should be accomplished uniformly.

⁶⁰⁵ Closer, but not precisely the same. Polansky (2007: 120) underlines the reference to two kinds of wholes: 'Souls seem to be wholes that are only complete rather than breaking up cleanly, since dividing certain living things results in new living things each having a whole soul of the same type, whereas a number is all the units ($\pi\acute{\alpha}\nu\tau\alpha$) or the sum ($\tau\omicron\ \pi\alpha\nu$) from which units can be taken rather than a strict whole'. However, the comparison of the soul with a $\delta\lambda\omicron\nu$ is problematic once division is at stake. It is the part, I believe, that is crucial for the argument, and not the whole. Indeed, the question is whether parts are homogeneous with the whole (which seems to be the case for the soul), or if they are to be considered as diverse (as in the case of numbers). For Aristotle's claim would be that, the parts of the soul being homogeneous, by dividing an animal into two, one would obtain two animals with two souls. But if parts *are not* homogeneous with the whole and the whole is rather *their sum*, by dividing a living being into two, one would not have the totality of units anymore and the souls would have a number which is different than the original one. In this respect, it is true that the difference is played by the *part*, insofar as it is a part of a $\pi\alpha\nu$ or a part of a $\delta\lambda\omicron\varsigma$. But there is something else going on here: for, precisely insofar as it is a $\delta\lambda\omicron\nu$ the soul should not be liable to division *in principle*. Because it is precisely according to its status of a $\delta\lambda\omicron\nu$ that by removing a part, the whole remains a whole. Let us take the example of the body from Chapter 6. By amputating an arm from a body, a body would not be less of a whole. But here Aristotle is contravening this principle. For, if the animal is divided, and so the soul, the result is that both parts of the animal would have *whole souls*. But if the soul was really a $\delta\lambda\omicron\nu$, then the division, in principle, should result in a part with the whole soul, and the other part with any. Moreover, the two types of division Aristotle points out are not even the same. For how can one subtract a number from the soul? This possibility relies on the assumption that the soul has a precise location, or, as Aristotle says later, that it is to be identified with the points in the body. Because if the number of the soul corresponds to the points of the body, then it would be clear why, by cutting a part of the body, one would also be subtracting a part of the soul.

In any case, the conclusion Aristotle reaches at the end is at least questionable. To say that animals, once bisected, continue to live amounts to saying that the soul is divisible, and that it is divisible homogeneously. In this respect, I take Aristotle's criticism to be biased. For it makes a great difference what body undergoes the division (e.g., if it is a plant, an animal or a human being) and the way the division is brought forth. If we take a branch of a plant and transplant it somewhere else, we can be confident it would actually live again. But if we attempt to do the same with the arm of an animal or of a man, this would hardly be the case. Even by conceding to Aristotle that the example is consistent with exceptional cases such as, e.g. that of a lizard, whose tail continues to move even once it is cut, the impulse for movement does not endure for long. And this is even more evident once life itself is at stake.

As to Xenocrates' theory of the soul, however, Aristotle bears no witness to how its parts were accounted for, nor does he provide information about how soul and body are supposed to interact. As a consequence, it is hard to imagine how Xenocrates would have replied. Once again, if we rely on Form-Numbers and Ideal-Geometricals as the closer parallel, it may well be that, although composed by parts, the soul is not divisible. In the end, this is the case with Form-Numbers: although composed of units, their units cannot be subtracted or added.

7. *[the soul cannot be subject and object of the same action]*

[FR. 112] εἰ δ' ἐν τῷ ζῳῷ τὸ κινεῖν ἢ ψυχὴ, καὶ ἐν τῷ ἀριθμῷ, ὥστε οὐ τὸ κινεῖν καὶ τὸ κινούμενον ἢ ψυχὴ, ἀλλὰ τὸ κινεῖν μόνον.⁶⁰⁶

But if that which produces movement in the animal is the soul, then it is also so in the number, so that the soul is not both that which produces movement and that which is moved, but only that which produces movement.

Aristotle starts off his new argument by distinguishing between what moves (τὸ κινεῖν) and what is moved (τὸ κινούμενον).⁶⁰⁷ This distinction is easily accountable for, when we have two objects at stake: on the one hand, the soul, principle of movement; on the other hand, the living being, which moves thanks to the action of the soul. Given this framework, it is easy to understand why things become more complicated when the soul itself is defined as a moving object already. If the theoretical framework is clear, it is harder to determine why Aristotle decides to emphasise the contradiction by establishing a parallel between the

⁶⁰⁶ Arist., *De Anima*, 409a17-19, transl. Hett.

⁶⁰⁷ Although 'τὸ κινούμενον' could be construed as a middle, i.e. 'what moves itself' I take the distinction here to be established clearly between an active mover and something which receives the impulse for movement. For also Aristotle's criticism in the next portion of text (8) points exactly in the same direction: if the impulse for movement is originated by a unit, then such a unit must be different from the others.

body and the number, both constructed with ἐν + the dative. Indeed, Aristotle appears to be saying that just as what produces movement in the animal is the soul, the same happens for the number, namely, the soul is responsible for the number's movement. This way, however, the objects at stake become three: the soul, the number and the body. And the soul *is* the number Aristotle is referring to. The problem arises precisely because the soul appears to both perform and suffer the action: it is the subject responsible for movement as well as the object which is moved. Accordingly, Aristotle concludes that the soul is only that which produces movement. Given the explanation, the parallel established between the living being and number becomes clearer. For Aristotle's intention is to show that given the impossibility for the soul to perform an activity and to suffer it at the same time, the soul needs to be distinguished into two different things: soul *and* number. In this respect, the problem keeps on being self-movement, and not how this movement is then transmitted to the body. For this reason, Aristotle can leave the body aside and concentrate on the contradictions that the definition of a self-moving object implies in principle.

8. *[the soul is a unit: simple objects cannot produce the impulse for movement]*

[FR. 112] ἐνδέχεται δὲ δὴ πῶς μονάδα ταύτην εἶναι; δεῖ γὰρ ὑπάρχειν τινὰ αὐτῇ διαφορὰν πρὸς τὰς ἄλλας.⁶⁰⁸

But how can this possibly be a unit? Such a unit must differ inherently from the others.

In these lines, Aristotle returns once again on the equation of the soul with a unit.⁶⁰⁹ Granted that the soul cannot move and be moved at the same time, one of its units must be responsible for the impulse of movement. However, in order for this to happen, such a unit should be differentiated from the others. The insistence on the need for (at least) a unit to be differentiated from others in order for movement to arise may suggest that units composing Xenocrates' soul are indeed *not* differentiated. This, of course, cannot be determined conclusively, as Aristotle's comment, although repeated, is only indirect. Nevertheless, if we take again Form-Numbers as a working parallel, the supposition is consistent. Just as the units composing each Form-Number were not internally differentiated, so it is in the case of the soul.

[FR. 112] στιγμῆς δὲ μοναδικῆς τίς ἂν εἴη διαφορὰ πλὴν θέσις; εἰ μὲν οὖν εἰσὶν ἕτεραι αἱ ἐν τῷ σώματι μονάδες καὶ αἱ στιγμαί, ἐν τῷ αὐτῷ ἔσσονται αἱ μονάδες· καθέξει γὰρ χώραν στιγμῆς. καίτοι τί κωλύει ἐν τῷ αὐτῷ εἶναι, εἰ δύο, καὶ ἀπείρους; ὧν γὰρ ὁ τόπος

⁶⁰⁸ Arist., *De Anima*, 409a19-21, transl. Hett.

⁶⁰⁹ For the difference between the two parts of Aristotle's complaints, see Polansky (2007: 121): 'This argumentation, which sounds much like that of 409a1-3, differs to some extent because previously the units were considered merely partless units whereas now they are bodily magnitudes, though still lacking sufficient differentiation to permit any to be movers'.

ἀδιαίρετος, καὶ αὐτά. εἰ δ' αἱ ἐν τῷ σώματι στιγμαὶ ὁ ἀριθμὸς ὁ τῆς ψυχῆς, ἢ εἰ ὁ ἐκ τῶν ἐν τῷ σώματι στιγμῶν ἀριθμὸς ἡ ψυχὴ, διὰ τί οὐ πάντα ψυχὴν ἔχουσι τὰ σώματα; στιγμαὶ γὰρ ἐν ἅπασιν δοκοῦσιν εἶναι καὶ ἄπειροι. ἔτι δὲ πῶς οἷόν τε χωρίζεσθαι τὰς στιγμὰς καὶ ἀπολύεσθαι τῶν σωμάτων, εἴ γε μὴ διαιροῦνται αἱ γραμμαὶ εἰς στιγμάς;⁶¹⁰

But what difference can a monadic point exhibit, except position?⁶¹¹ If then the soul-units in the body are different from the points in the body, the former will be in the same place as the latter, for each will occupy the place of a point. And yet if two units can be in the same place, why not an infinite number? for things which occupy an indivisible space are themselves indivisible. But if the bodily points are identical with the units of the soul number, or if the number of bodily points is the soul, why do not all bodies have a soul? For there appear to be points—ininitely many, indeed—in all of them. And again how is it possible to separate the points and free them from the bodies, if lines cannot be resolved into points?

The conclusion of Aristotle's report is an attempt to locate the soul within the body according to a relation Aristotle establishes between points of the body and units in the soul. Aristotle provides two mutually exclusive options and then rejects them both. Accordingly, I understand the argument to be as follows:

If (a) the points of the body and the units of the soul are co-extensive, then:

- Since the units of the soul are in one way or another located in the body, they would nonetheless occupy the space of a point. And if two things occupy the same space, why are these things not infinite?⁶¹² For things which occupy an indivisible space (such as points) will themselves be indivisible.

If, alternatively, (b) the points of the body and the units of the soul are *not* co-extensive, then:

- Every body would have a soul, although this is clearly not the case.
- The soul cannot be separated from the body.

It is obviously hard, in absence of further evidence, to determine the accuracy of Aristotle's report. In general, I find unconvincing that the correlation between points and units was advanced by Xenocrates himself. In the end, Aristotle himself mentions that,

⁶¹⁰ Arist., *De Anima*, 409a21-31, transl. Hett.

⁶¹¹ This is, once more, reminiscent of atomistic conceptions. On Xenocrates' atomism as the roots for the Epicurean theory of *minima*, see Verde (2013: 128-183).

⁶¹² Shields (2010: 148) interprets the argument slightly differently: 'Aristotle first seems to reason that if the soul is a unit, and if there are a plurality of souls, then the soul must be a point, since a point is a unit having position (cf. 409a6)'. The assumption that the soul is a unit is in fact maintained throughout the argument. Building on the assumption that the body, as a magnitude, can be divided infinitely, Shields concludes Aristotle is arguing that 'either each individual point of the body is to be identified with a soul, conceived as a point, or it is not. If not, then there are conceivably an infinite number of souls in the same place as each point in the body which is absurd' (149). However, granting the same premise of the infinite divisibility of the body, I take the argument to show that the units of the soul would nonetheless occupy the same place of points in the body. But given that the space occupied by a point is indivisible, this is absurd.

according to Xenocrates' premises, lines cannot be resolved into points. In this respect, a correlation between units and points would have certainly generated contradictions: if the body can be resolved into points, why wouldn't the line? The reference to the line in the context of a spatial consideration of the soul, however, brings up a further issue. Throughout the chapter, I have argued that Xenocrates' world is rooted in a continuous conception of reality, in which the soul too is inscribed. But if Xenocrates' world is as continuous as I have claimed, why not rely on the concept of line, rather than on that of number, in defining the soul? In the end, a geometrical concept could have granted the same cognitive access to the metaphysical world. However, while the line can be considered with respect to spatial extension, number cannot. And this is confirmed by Aristotelian critiques; for, in order to discuss the location of the soul, Aristotle needs to equate units and points, so as to grant the latter with a position. Accordingly, the concept of number, besides granting epistemic functions to the soul, might have offered Xenocrates a further advantage: the absence of physical extension. This, as already emphasised in the previous sections, is crucial: on the one hand, it allows the soul to introduce movement in the system but prevents it from undergoing any kind of (physical) change. On the other hand, the introduction of movement is also crucial with respect to physical bodies. For when movement is considered with respect to these latter, it establishes the condition for change to arise.

Conclusion

To wrap everything up, what can we say about Xenocrates' theory of the soul?

In section 7.2 I have argued that the 'methodological' passage preserved in Aristotle's *Posterior Analytics* presents an occasion to think about the rationale of Xenocrates' definition: the soul is defined as a 'self-moving number' primarily to account for its capacity to produce life. Given this objective, the definition of the soul exposes a larger goal: a coherent account of the middle status of the soul, which allows ontological continuity and diversity at different levels of the system. At a general level, the introduction of movement allows Xenocrates to account for change in the sensible realm; at a particular level, the connotation of the soul as a number grants the soul with epistemic capacities and excludes it from physical consideration. This way, self-movement is used to differentiate the soul from Form-Numbers and Ideal Geometricals despite its mathematical characterisation. At the same time, the capacity to self-move differentiates ensouled bodies from mere bodies. The latter, being defined by their liability to movement but incapable to move themselves, receive an explanation for their perishment and change.

In this respect, the definition of the soul as a ‘self-moving number’ brings together and, more importantly, accommodates, two equally essential factors, which, as I have argued in section 7.3, both concur in construing the linkage between the two worlds. It is precisely this double depiction of the soul that draws Aristotle’s sharp criticism. For Aristotle takes Xenocrates’ theory to be vulnerable to objections regarding both self-movement and its status of number. By doing so, however, he fails to realise that the paradox Xenocrates creates is indeed meant to be a paradox *so as to* explain functions of both the sensible and metaphysical worlds.

Nevertheless, Aristotle’s criticism of the self-moving number theory offers an occasion to think about the details of Xenocrates’ doctrine. Even if such details must remain undetermined, we can at least provide some suggestions.

Accordingly: (i) is the soul partless? And if it isn’t, (ii) should the units of the soul be considered its parts or, rather, its parts should be conceived of differently? Many Aristotelian critiques hint at a unitarian and partless conception of the soul: Aristotle compares the soul to a unit two times; he points out at the necessity for an internal differentiation of the soul, if the soul needs to be capable of the impulse for movement; he underlines how the soul would cease to be the same number if the body undergoes a division. In all of these critiques, Aristotle takes the soul’s unity to be constituted by the sum of all of its units, and, therefore, of its parts. At the same time, we cannot take these suggestions as compelling evidence to conclude that Xenocrates’ soul is partless:⁶¹³ in the end, the question is equally complicated when asked in relation to Form-Numbers. And given that the soul is a number, it is legitimate to transpose the question. Form-Numbers are indeed constituted by parts (since their units can be considered as such), and yet their parts are not divisible. If the parallel is relevant, then the soul, although constituted by parts, is nevertheless not divisible. However, one could add that, although being conceivable as parts, the units constituting Form-Numbers are more like elemental constituents than actually differentiated parts. Units of the Dyad are different than those of the Triad, but nothing is said about a possible internal differentiation of the units composing the Triad themselves. Yet, to consider the soul as constituted by parts would

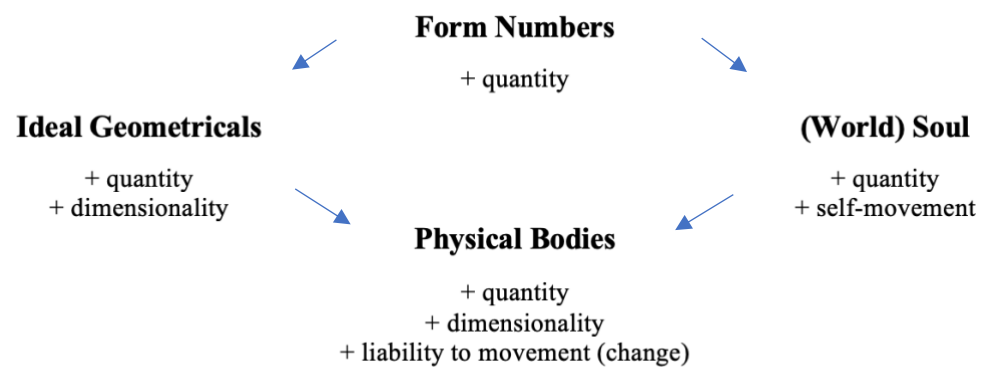
⁶¹³ The bipartition of the soul is usually attributed to Xenocrates (and Speusippus) on the basis of a passage of ps-Olympiodorus’ commentary on the *Phaedo* (*In Plat. Phaed.* 74=fr. 131 IP), in which the Academics are said to extend the immortality of the soul μέχρι της ἀλογίας. (see, e.g. Rees 1957; Schibli 1993). Isnardi Parente also concludes that Xenocrates abandoned Plato’s tripartite psychology in favor of a bipartite one (309). For her conclusion, fr. 126 is particularly important (*Theod., Graecarum affectionum curatio*) as Theodoretus says Xenocrates’ soul to be τὸ μὲν αἰσθητικόν, [...] τὸ δὲ λογικόν. Such a conclusion, is, on the basis of Aristotle’s testimony exclusively, impossible to reach. However, since the claim that the soul is partly sensible and partly intelligible (this is how Isnardi Parente translates λογικόν) can also be deduced from Xenocrates’ definition *only*, the passage does not need to be taken as a confirmation of the bipartition.

a) possibly be advantageous in terms of accounting for different functions and b) more in line with Plato's psychology. But how can one maintain that parts of the soul are homogeneous and still perform different tasks?

A possible answer may lie in the fact that the soul, despite its mathematical characterisation, is never characterised as a Form. This may grant more flexibility to the way we conceive of 'number'. For example, one may think of the definition 'self-moving number' also as a number whose conformation is in constant modification. In that case, the soul would maintain the homogeneity of its parts,⁶¹⁴ but it could develop different combinations of its units in order to perform its different functions.

A second issue Aristotle raises is related to the spatial extension of the soul. Is the soul spatially extended or, to put it differently, does it occupy a place? Aristotle insistently establishes a relation between the units of the soul and the points of the body in order to show that, also from a materialistic point of view, the conception of the soul as a number is inconsistent. The topic is obviously complicated and cannot be determined conclusively. However, I suggested a few possibilities in line with my interpretative direction. We have seen that the production of dimensionality already takes place with Ideal-Geometricals. Hence, there must be a way in which ideal and physical magnitudes differ, and I suggested that this condition may be taken to be the liability to movement, a condition which adds up at the level of the soul. If this is the case, it is important to emphasise that, although magnitudes have been, so to say, already produced at an earlier stage of the system, the soul is not taken to be an Ideal magnitude, but rather a number. The difference is crucial, for Aristotle's problem in trying to locate Xenocrates' soul is precisely to establish a comparison with something which does have a position and occupies a place. But the fact that the soul is characterised as number does not admit such critiques. If the tentative reconstruction I provided is at least slightly reliable, we could conceive of Xenocrates' world as follows:

⁶¹⁴ This suggestion, however, would maintain that the soul, to a certain extent, does change. In need of an explanation for this aspect, one could imagine that since the soul's units would be constant in number nevertheless, change would be minimised to movement only.



I

Conclusions

This study has proposed a new methodology for the reconstruction of the metaphysical and epistemological theories of the first two scholarchs of the Academy, Speusippus and Xenocrates. In particular, given the unsatisfactory picture of Speusippus and Xenocrates obtained from previous collections and studies, this thesis has sought to test a new methodology, consisting of an in-depth analysis of Aristotelian testimonia, with the aims of: a) understanding Early Academic theories as internal responses to problems raised in the Academy and connected to Plato's doctrine; b) understanding the critical impulse Aristotle provided for this process of development; c) re-assessing Speusippus' and Xenocrates' Platonic inheritance on these bases. The overall goal of this thesis was to offer a starting point for the re-consideration of Speusippus' and Xenocrates' theories and pave the way for further studies on the topic. The expected outcome of this analysis was to show that Aristotelian testimonia allow a contextualisation of Speusippus' and Xenocrates' doctrines within the environment of the Academy, by exposing a set of problems the two scholars are targeting in order to defend Platonic theories from the inconsistencies detected by Aristotle.

Accordingly, Section I revealed that, if we take participation to have constituted a crucial problem for Speusippus, the interventions in his system, as well as the rejection of Plato's Theory of Forms, are understandable in view of his epistemological worries. Each ontological section of Speusippus' system is symmetrically separated from the others so as to guarantee distinctive practices and independence to each of them. In this respect, the mathematical world does not constitute a paradigmatic model for the sensible, nor does it express any causality over sensible bodies, the enquiry into which deserves to be conducted according to different rules than those reserved for mathematical and geometrical objects. It is for the same reason that each ontological domain has its peculiar principles, conceived as the explanatory and analytical causes of its objects. On this account, the One and the Plurality are *not* conceived as principles of all things, but of mathematical number *only*. This permits objects populating each domain to remain homogeneous to one another and requires that they do not serve as explanatory for other levels.

Given the separation of the ontological levels in the system, Aristotle harshly criticises Speusippus for not having accounted for a single and unifying principle ruling over his world. Although he is sympathetic to some of the choices Speusippus adopted, Aristotle

believed that Speusippus' system could not account for the ontological priority of some elements over the others. The absence of causal function between different levels, in fact, rescinds the ontological link which was indeed needed for their ontological arrangement.

The arrangement of Xenocrates' world appears to be responsive to the two main shortcomings Aristotle identified in Speusippus' philosophy. As Section II highlighted, on the one hand, the transition from one ontological level to another appears to be justified on the basis of ontological similarities; on the other hand, these ontological similarities grant Xenocrates' world with an exceptional continuity, whilst still accounting for the differentiation and progression at each level. Moreover, Xenocrates seems not only to be receptive of Aristotle's criticisms of Speusippus, but also to justify his views on the basis of shared assumptions with Aristotle. It may not be an accident, then, that the criticism Aristotle addresses against Xenocrates insists almost exclusively on notions he finds contradictory: that of Form-Number and that of soul *qua* self-moving number. In the attempt to fix the problems Aristotle had raised against Speusippus, in fact, Xenocrates coined notions which combine features of different ontological levels. The continuity of his world is, in Aristotle's perspective, only accounted for formally.

The picture which emerges out of this analysis of Aristotelian testimonia is a continuous discussion taking place within the Academy. Both Speusippus' and Xenocrates' systems are shown to be extremely responsive of Aristotle's assessment of their theories and demonstrate a strong awareness of the problems that previous formulations created. It is precisely in this awareness that their Platonic inheritance needs to be recovered. The theories of Speusippus and Xenocrates do not exhibit a total deviation from Plato's thought; both accept the ontological hierarchy Plato established, which features mathematics and geometry in a prominent position. Speusippus' doctrine, although it appears to present a more explicit departure from that of his master, is, in the end, motivated by the need to find an appropriate way to explain the objects populating this world, and to justify different modes of understanding. What decisively constitutes the diversity of Speusippus' and Xenocrates' solutions is their distinctive philosophical concerns, as well as the recognition of previous problematic explanations. If, for Speusippus, the main flaw of Plato's doctrine lies in the epistemological complications it created, Xenocrates' system appears to be driven by the worry to produce a more justified ontological transition, which is precisely what was missing in Speusippus' system. In this respect, both philosophers sought to save the legacy left behind by their master, especially in the light of Aristotle's polemic.

If the account I have provided is justified, the results of this thesis would compel us, once again, to go back to Plato. Not only would the Platonic legacy of his students (Speusippus, Xenocrates *and* Aristotle) need to be reconsidered, but also, and most of all, a novel understanding of their Platonic legacy could in fact provide us with completely new ways to read Plato's own ideas and what we assume to be his key doctrines. For the picture of Speusippus' and Xenocrates' theories emerging out of Aristotle's testimonia tells an entirely different story about the birth of Platonism: the first two scholars neither severed their connections with their master nor replicated his theories superficially; on the contrary: they took their lead from Plato's doctrines because of the philosophical issues it addressed. In fact, in their individual reactions to his doctrine both Speusippus and Xenocrates appear to be much more committed to discuss *specific philosophical problems* rather than attached to specific Platonic tenets. If Cherniss' exemplary works led scholars to determine Aristotle's accounts essentially unreliable, a novel picture of Plato may emerge if one turns to Speusippus' and Xenocrates' theories for consideration. In the context of his students' reactions to his work, whether favourable (Speusippus and especially Xenocrates) or less so (Aristotle), Plato's immediate legacy may be revealed to be completely different.

Bibliography

Edition of fragments:

Speusippus

- M. **ISNARDI PARENTE** (ed.), (1980) *Speusippo. Testimonianze e frammenti*, Napoli: Bibliopolis.
- M. **ISNARDI PARENTE** (ed.), (2005) *Speusippo. Testimonianze e frammenti*, ed. elettronica, Roma: C.I.S.A.D.U. (<http://rmcisadu.let.uniroma1.it/isnardi/fronte.htm>).
- M. **ISNARDI PARENTE**, (1995) 'Supplementum academicum: per l'integrazione e la revisione di Speusippo Frammenti e Senocrate-Ermodoro, Frammenti, «La scuola di Platone» I e III (collezione diretta da M. Gigante), ed. trad. commento a cura di M. Isnardi Parente, Napoli (Bibliopolis) 1980 e 1982', *Atti dell'Accademia Nazionale dei Lincei* 9.7 (2), 249-311.
- P. **LANG**, (1911) *De Speusippi Academici Scriptis, Accedunt Fragmenta*, Diss., Bonn.
- F. **RAVAISSON**, (1838) *Speusippi de primis rerum principiis placita qualia fuisse videntur ex Aristotele*, Parisiis.
- L. **TARÁN**, (1981) *Speusippus of Athens: a critical study with a collection of the related texts and commentary*, Leiden: Brill.

Xenocrates

- M. **ISNARDI PARENTE**, (1986) *Senocrate-Ermodoro: Frammenti. Edizione, traduzione e commento*, Napoli: Bibliopolis.
- M. **ISNARDI PARENTE** (ed.), (2012) *Senocrate - Ermodoro, Testimonianze e Frammenti*. Edizione rivista e aggiornata a cura di T. **DORANDI**, Napoli: Bibliopolis.

Translations and commentaries:

Aristotle, Metaphysics

- E. **BERTI**, (2017) *Aristotele, Metafisica*. Bari-Roma: Laterza.
- H. **BONITZ**, (1849) *Aristotelis Metaphysica: Commentarius*, Bonn.
- G. **REALE** (ed.), (1993) *Aristotele, Metafisica*, Milano: Rusconi.
- W.D. **ROSS**, (1924a) *Aristotle's Metaphysics. A revised text with introduction and commentary*. (vol. 1), Oxford: Clarendon Press.
- W.D. **ROSS**, (1924b) *Aristotle's Metaphysics. A revised text with introduction and commentary*. (vol. 2), Oxford: Clarendon Press.
- W.D. **ROSS**, (1984) *Aristotle: Metaphysics*, in J. **BARNES** (ed.), (1984b) *The complete works of Aristotle; The revised Oxford translation* (vol. 2), Princeton: Princeton University Press.
- J. **TRICOT**, (1953) *Aristote. Métaphysique. Nouvelle édition entièrement refondue, avec commentaire de J. Tricot*, Paris: Vrin.

Aristotle, *Metaphysics* books M and N

J. ANNAS, (1976) *Aristotle's Metaphysics. Books M and N*, Oxford: Clarendon Press.

M. CRUBELLIER, (1994) *Les livres 'Mu' et 'Nu' de la Métaphysique d'Aristote: traduction et commentaire*, 4 vols., Thèse de doctorat, Université Charles-de-Gaulle Lille III.

Aristotle, *Other texts*

S. ALEXANDRU, (2014) *Aristotle's Metaphysics Lambda. Annotated critical edition based upon a systematic investigation of Greek, Latin, Arabic and Hebrew sources*, Leiden-Boston: Brill.

E. BARBOTIN, (traduction et notes de), A. JANNONE (texte établi par), (1966) *Aristote. De l'âme*, Paris: Belles Lettres.

J. BARNES (ed.), (1984a) *The complete works of Aristotle; The revised Oxford translation* (vol. 1), Princeton: Princeton University Press.

J. BARNES (ed.), (1984b) *The complete works of Aristotle; The revised Oxford translation* (vol. 2), Princeton: Princeton University Press

J. BARNES, (1994) *Aristotle: Posterior Analytics*, Oxford: Clarendon Press.

H. BONITZ, (1849) *Aristotelis Metaphysica: Commentarius*, Bonn.

D. BOSTOCK, (1994) *Aristotle. Metaphysics: books Z and H*, Oxford: Clarendon Press.

A.L. CARBONE, (2002) *Aristotele, L'anima e il corpo. Parva naturalia*, Milano: Bompiani.

B. CENTRONE (ed.), (2005) *Il libro Iota della Metafisica di Aristotele*, Sankt Augustin: Academia Verlag.

G. COLLE, (1922) *Aristote: La Métaphysique*, Livres II et III, Louvain/Paris.

M. FREDE, G. PATZIG, (1988) *Aristoteles: Metaphysik Z*, München: Beck.

G.R. GIARDINA, (2008) *Aristotele. Sulla generazione e la corruzione. Introduzione, traduzione e note di Giovanna R. Giardina (con testo greco edizione M. Rashed)*, Roma: Aracne.

C. KIRWAN, (1998) *Aristotle: Metaphysics, Books Γ and E. Translated with notes*, Oxford: Clarendon Press.

A. MADIGAN, (1999) *Aristotle. Metaphysics Books B and K 1–2*, Oxford: Oxford University Press.

S. MAKIN, (2006) *Aristotle: Metaphysics, Book Θ. Translated with an Introduction and Commentary*, Oxford: Clarendon Press.

M. MIGLIORI, L. PALPACELLI, (2013) *Aristotele: La generazione e la corruzione*, Milano: Bompiani.

M. MIGNUCCI (ed.), (2007) *Aristotele: Analitici secondi. Organon IV*, Roma-Bari: Laterza.

C. SHIELDS, (2016) *Aristotle. De Anima*. Oxford: Oxford University Press.

M. SHIFFMAN, (2011) *Aristotle. De Anima*, Newburyport, MA: Focus Publishing.

H. TREDENNICK, (1945) *Aristotle, Metaphysics*, Cambridge, MA: Harvard University Press.

- P.B. **ABRAHAM**, (2010) 'A lost sentence on seed as instrument of the soul in Aristotle's *On the soul* II, 4, 415b 7', *Hermes* 138, 276-287.
- F. **ACERBI**, (2010) *Il silenzio delle sirene. La matematica greca antica*, Roma: Carocci.
- J. **ANNAS**, (1975) 'Aristotle, Number and Time', *The Philosophical Quarterly* 25, 97-113.
- J. **ANNAS**, (1992) *Interpretazione dei libri M-N della 'Metafisica' di Aristotele. La filosofia della matematica in Platone e Aristotele. Traduzione di Elisabetta Cattanei. Introduzione e traduzione dei libri M-N della 'Metafisica' di Aristotele di Giovanni Reale*, Milano: Vita e Pensiero.
- F. **ARONADIO**, (2014) 'La "caccia" dialettica in alcuni luoghi platonici', in R.L. **CARDULLO**, D. **IOZZIA** (eds.), *KALLOS KAI ARETE: Bellezza e Virtù. Studi in onore di Maria Barbanti*, Acireale-Roma: Bonanno, 67-77.
- F. **AST**, (1953) *Lexicon Platonicum sive vocum Platoniarum* (in 4 vols.), Lipsiae: Libreria Weidmanniana.
- T. **AUFFRET**, (2015) 'Une témoignage négligé de Théophraste sur la théorie platonicienne des lignes (*Metaph.* 6a 24-6b16)', in A. **JAULIN**, D. **LEFEBVRE** (eds.), *La Métaphysique de Théophraste. Principes et Apories*, Leuven-Paris-Bristol: Peeters.
- J. **BARNES**, (1976) 'Aristotle, Menaechmus, and circular proof', *The Classical Quarterly* 26, 278-292.
- G. **BECHTLE**, (2002) 'Speusippus and the *Anonymus Commentary* on Plato's *Parmenides*: how can the One be a *minimum*?', in M. **BARBANTI**, F. **ROMANO** (eds.), *Il Parmenide di Platone e la sua tradizione. Atti dell'III Colloquio Internazionale del Centro di Ricerca sul Neoplatonismo. Università degli Studi di Catania, 31 maggio – 4 giugno 2001*, *Symbolon* 24, Catania: CUECM, 281-306.
- G. **BECHTLE**, (2010a) 'Speusippus neutral conception of the One and Plato's *Parmenides*' in J.D. **TURNER**, K. **CORRIGAN** (eds.), in *Plato's Parmenides and its heritage. Vol 1: History and Interpretation from the Old Academy to Later Platonism and Gnosticism*, Atlanta: Society of Biblical Literature, 37-58.
- G. **BECHTLE**, (2010b) 'The *Anonymus Commentary* on Plato's *Parmenides* and Aristotle's *Categories*: some preliminary remarks', in J.D. **TURNER**, K. **CORRIGAN** (eds.), *Plato's Parmenides and its heritage. Vol 1: History and Interpretation from the Old Academy to Later Platonism and Gnosticism*, Atlanta: Society of Biblical Literature, 243-258.
- T. **BÉNATOUÏL**, D. **EL MURR**, (2010) 'L'Académie et les géomètres: usages et limites de la géométrie de Platon à Carnéade', *Philosophie Antique* 10, 41-80.
- T. **BÉNATOUÏL**, (2017) 'Speusippe et Xénocrate ont-ils systématisé la cosmologie du *Timée*?', in M.-A. **GAVRAY**, A. **MICHALEWSKY** (eds.), *Les principes cosmologiques du Platonisme*, Turnhout: Brepols, 19-38.
- E. **BERTI**, (2009) 'Aporiai 6-7' in M. **CRUBELLIER**, A. **LAKS** (eds.), *Aristotle: Metaphysics Beta. Symposium Aristotelicum*, 105-134.
- G. **BERTOLINI**, (2018) *Kosmos tis somatikos. Il 'sistema' metaforico del Filebo di Platone*, Roma: Tored.

- R. **BODÉÛS**, (1984) Review of ‘L. **TARÁN**, (1981) *Speusippus of Athens: a critical study with a collection of the related texts and commentary*, Leiden: Brill’, *Revue Philosophique de Louvain* 53, 116-119.
- R. **BOLTON**, (2010) ‘Définition et méthode scientifique dans *Les Seconds analytiques* et dans *La Génération des animaux* d’Aristote’, in **BOLTON**, *Science, dialectique et éthique chez Aristote: essais d’épistémologie aristotélicienne*, Leuven-la-Neuve: Éditions Peeters, 163-218.
- M. **BONAZZI**, (2007) ‘Eudorus’ psychology and Stoic ethics’, in M. **BONAZZI**, C. **HELMIG** (eds.) *Platonic Stoicism - Stoic Platonism. The dialogue between Platonism and Stoicism in Antiquity*, Leuven: Leuven University Press, 109-132.
- M. **BONAZZI**, (2015) *Il platonismo*. Torino: Einaudi.
- H. **BONITZ**, (1870) *Index Aristotelicus*, Berolini.
- A.P. **BOSS**, (2007) ‘Aristotle on Dissection of Plants and Animals and his Concept of the Instrumental Soul-Body’, *Ancient Philosophy* 27, 95-106.
- A.C. **BOWEN**, (1983) ‘Menaechmus versus the Platonists: two theories of science in the Early Academy’, *Ancient Philosophy* 3, 12-29.
- A. **BRANCACCI**, (1999) ‘Le περὶ ἡδονῆς d’Héraclide du Pont (fr. 55 Wehrli)’, in M. **DIXSAUT** and F. **TEISSERENC** (eds.), *La fêlure du Plaisir. Études sur le Philèbe de Platon II*, Paris: Contextes, 99-125.
- K. **BRINGMANN**, (1972) ‘Platons *Philebos* und Herakleides Ponticus’ Dialog περὶ ἡδονῆς’, *Hermes* 100, 523-530.
- L. **BRISSE**, (2004) ‘Aristotle and the beginnings of allegorical exegesis’ in Brisson (ed.) *How philosophers saved myths: allegorical interpretation and Classical mythology*, translated by **TIHANYI**, Chicago and London: The University of Chicago Press, 29-40.
- L. **BRISSE**, (2010) ‘The fragment of Speusippus in Column I of the *Anonymus Commentary on the Parmenides*’, in J.D. **TURNER**, K. **CORRIGAN** (eds.), *Plato’s Parmenides and its heritage. Vol 1: History and Interpretation from the Old Academy to Later Platonism and Gnosticism*, Atlanta: Society of Biblical Literature, 59-68.
- D. **BRONSTEIN**, (2016) *Aristotle on Knowledge and Learning. The Posterior Analytics*, Oxford: Oxford University Press.
- W. **BURKERT**, (1972) *Lore and Science in Ancient Pythagoreanism*, Cambridge (MA): Harvard University Press.
- M. F. **BURNEYAT**, (1987) ‘Platonism and mathematic: a prelude to discussion’ in A. **GRAESER** (eds.), *Mathematik und Metaphysik bei Aristoteles – Mathematics and Metaphysics in Aristotle, proceedings of the tenth Symposium Aristotelicum*, Berne: Haupt, 213-239.
- M.F. **BURNEYAT**, (1990) *The Theaetetus of Plato*, Indianapolis: Hackett.
- M.F. **BURNEYAT**, (2001) *A Map of Metaphysics Zeta*, Pittsburgh: Mathesis Publication.
- G. **CAMBIANO**, (2011) ‘Speusippo e la percezione scientifica’, *Antiquorum Philosophia* 5, 99-117.
- R.L. **CARDULLO**, (2002) ‘Asclepio di Tralle: pensatore originale o mero redattore ἀπὸ φωνῆς?’ in M. **BARBANTI**, G. R. **GIARDINA**, P. **MANGANARO** (eds.), *Omaggio a Francesco Romano*, Catania: CUECM, 495-514.

- J.W. CARTER, (2019) 'How Aristotle Changes Anaxagoras' Mind', *Apeiron* 52, 1-28.
- L.M. CASTELLI, (2010) *Problems and paradigms of Unity: Aristotle's Account of the One*, Sankt Augustin: Academia Verlag.
- L.M. CASTELLI, (2013) 'Universals, Particulars and Aristotle's Criticism of Plato's Forms', in R. CHIARADONNA, G. GALLUZZO (eds.), *Universals in Ancient Philosophy*, Pisa: Edizioni della Normale, 139-184.
- E. CATTANEI, (1989) 'Per una rilettura dei libri «M» e «N» della «Metafisica» di Aristotele alla luce delle «dottrine non scritte» di Platone e dei loro sviluppi nel pensiero dell'Accademia antica', *Rivista di Filosofia Neo-Scolastica* 81, 543-558.
- E. CATTANEI, (1990a) 'I metodi della metafisica Platonico-Accademica «generalizzante» ed «elementarizzante» nei libri «M» e «N» della «Metafisica» di Aristotele', *Rivista di Filosofia Neo-Scolastica* 82 (2-3), 183-213.
- E. CATTANEI, (1990b) 'Un'ipotesi sul concetto Aristotelico di astrazione: la sostituzione da parte di Aristotele in *Met. M, N*, dei metodi della metafisica Platonico-Accademica «generalizzante» ed «elementarizzante» con l'astrazione universalizzatrice', *Rivista di Filosofia Neo-Scolastica* 82, 578-586.
- E. CATTANEI, (1996) *Enti matematici e metafisica: Platone, l'Accademia e Aristotele a confronto. Prefazioni di Imre Toth e Thomas A. Szlezák*, Milano: Vita e Pensiero.
- D. CHARLES, (2001) *Aristotle on Meaning and Essence*, Oxford: Clarendon Press.
- W. CHENG, (2018) 'Δυσχέρεια and Ἀπορία: the formation of a philosophical term', *TAPA* 148, 75-110.
- H.F. CHERNISS, (1935) *Aristotle's Criticism of Presocratic Philosophy*, New York: Octagon Books.
- H.F. CHERNISS, (1945) *Aristotle's Criticism of Plato and the Academy*, Baltimore: The Johns Hopkins Press.
- H.F. CHERNISS, (1962) *The Riddle of the Early Academy*, Berkeley-Los Angeles: University of California Press.
- H.F. CHERNISS, (1971) 'Compte-rendu', in H.D. SAFFREY, *Le ΠΕΡΙ ΦΙΛΟΣΟΦΙΑΣ d'Aristote et la Théorie platonicienne des idées nombres*, Leiden: Brill, 71-89.
- R. CHIARADONNA, G. GALLUZZO (eds.), (2013) *Universals in Ancient Philosophy*, Pisa: Edizioni della Normale.
- S.M. COHEN, (2016) 'Aristotle's Metaphysics', *The Stanford Encyclopedia of Philosophy* (Winter 2016 Edition), E. N. ZALTA (ed.), (<https://plato.stanford.edu/archives/win2016/entries/aristotle-metaphysics/>).
- B. COLLETTE - DUČIĆ, (2008) 'Sophiste', in A. MOTTE - P. SOMVILLE (eds.), *Ousia dans la philosophie grecque des origines à Aristote*, Louvain-la Neuve: Éditions Peeters, 143-158.
- J.M. COOPER, (1999) 'Posidonius on Emotions', in J. M. COOPER (ed.), *Reason and Emotions. Essays on Ancient Moral Psychology and Ethical Theory*, Princeton: Princeton University Press, 449-484.
- P. CORKUM, (2008) 'Aristotle on Ontological Dependence', *Phronesis* 53, 65-92.

- T.J. CROWLEY, (2005) 'On the use of *stoicheion* in the sense of 'element'', *Oxford Studies in Ancient Philosophy* 29, 367-394.
- M. CRUBELLIER, (2000) 'Metaphysics Λ 4' in M. FREDE, D. CHARLES (eds.), *Aristotle's Metaphysics Lambda. X Symposium Aristotelicum*, Oxford: Oxford University Press, 137-160.
- P. CURD, (2007) *Anaxagoras of Clazomenae: Fragments. Text and Translation with Notes and Essays*, Toronto: University of Toronto Press.
- R. M. DANCY, (1991) *Two studies in the Early Academy*, Albany N.Y.: State University of New York Press.
- R. DANCY, (2016) 'Speusippus', *The Stanford Encyclopedia of Philosophy* (Winter 2016 Edition), E.N. Zalta (ed.), <https://plato.stanford.edu/archives/win2016/entries/speusippus/>.
- R. DANCY, (2017) 'Xenocrates', *The Stanford Encyclopedia of Philosophy* (Spring 2017 Edition), E.N. ZALTA (ed.), <https://plato.stanford.edu/archives/spr2017/entries/xenocrates/>.
- F.A. DE HAAS, (2011) 'Principles, conversion and circular proof. The reception of an Academic Debate in Proclus and Philoponus', in T. BÉNATOUÏL, E. MAFFI, F. TRABATTONI (eds.), *Plato, Aristotle, or both? Dialogues between Platonism and Aristotelianism in Antiquity*, Hildesheim: Olms, 215-240.
- S. DELCOMMINETTE, (2008a) 'République' in A. MOTTE - P. SOMVILLE (eds.), *Ousia dans la philosophie grecque des origins à Aristote*, Louvain-la Neuve: Éditions Peeters, 101-111.
- S. DELCOMMINETTE, (2008b) 'Théétète', in A. MOTTE - P. SOMVILLE (eds.), *Ousia dans la philosophie grecque des origins à Aristote*, Louvain-la Neuve: Éditions Peeters, 131-142.
- S. DELCOMMINETTE, (2008c) 'Politique', in A. MOTTE - P. SOMVILLE (eds.), *Ousia dans la philosophie grecque des origins à Aristote*, Louvain-la Neuve: Éditions Peeters, 159-163.
- E. DES PLACES, (1964) *Lexique de la langue philosophique et religieuse de Platon* (in 2 vols), Paris: Les Belles Lettres.
- J.M. DILLON, (1990a) 'Female principles in Platonism', in DILLON (ed.), *The Golden Chain*, Aldershot: Variorum, 107-123.
- J.M. DILLON, (1990b) 'Speusippus in Iamblichus', in DILLON (ed.), *The Golden Chain*, Aldershot: Variorum, 325-332.
- J.M. DILLON, (1999) 'Speusippe et le plaisir', in M. DIXSAUT and F. TEISSERENC (eds.), *La fêlure du Plaisir. Études sur le Philèbe de Platon II*, Paris: Contextes, 83-98.
- J.M. DILLON, (2003) *The Heirs of Plato. A study of the Old Academy (347-274 BC)*, Oxford: Clarendon Press.
- J.M. DILLON, (2010) 'Speusippus and the Ontological Interpretation of the *Parmenides*', in J.D. TURNER, K. CORRIGAN (eds.) *Plato's Parmenides and its heritage. Vol 1: History and Interpretation from the Old Academy to Later Platonism and Gnosticism*, Atlanta: Society of Biblical Literature, 67-78.
- J.M. DILLON, (2012) 'Reconstructing the Philosophy of Speusippus: A Hermeneutical Challenge' in U. BRUCHMÜLLER, *Platons Hermeneutik und Prinzipiendenken im Licht der Dialoge und der antiken Tradition*, Zürich/New York: Georg Olms, 185-202.
- J.M. DILLON, (2018) 'Theories of knowledge in the Old Academy', in F. VERDE and M. CATAPANO (eds.), Special Issue: 'Hellenistic Theories of Knowledge', *Lexicon Philosophicum* 6, 43-51.

- E. DODDS, (1928) 'The *Parmenides* of Plato and the Neoplatonic One', *Classical Quarterly* 22, 129-142.
- T. DORANDI, (1992) 'Il quarto libro di Diogene Laerzio', *ANRWII* 36, 3761-3792.
- T. DORANDI, (1999) 'Vies de Speusippus et Xénocrate', in J.F. BALAUDÉ, L. BRISSON, J. BRUNSCHWIG, T. DORANDI, M.O. GOULET-CAZÉ, R. GOULET, M. NARCY (introductions, traductions et notes de) et M. PATILLON (avec la collaboration de), *Diogène Laërce: Vies et doctrines des philosophes illustres*, Paris: Librairie Générale Française, 490-502.
- T. DORANDI, (2008) 'Notes critiques et exégétique aux livres III à V des *Vies des philosophes* de Diogène Laërce', *Eikasmos* 19, 241-262.
- T. DORANDI (ed.), (2013) *Diogenes Laertius: Lives of eminent philosophers*, New York: Cambridge University Press.
- H. DÖRRIE, (1967) 'Xenokrates, 4', *Real-Encyclopädie IX A 2*, 1512–1528.
- A. FALCON, (2000) 'Aristotle, Speusippus, and the method of division', *The Classical Quarterly* 50, 402-414.
- F. FERRARI, (2015) 'Asimmetria e non-reversibilità nella metafisica di Platone', in R. RADICE, G. TIENGO (eds.), *Seconda navigazione. Omaggio a Giovanni Reale*, Milano: Vita e Pensiero, 219-232.
- F. FERRARI, (2016) 'Lo schema proteron-hysteron e la gerarchia ontologica in Platone: aspetti e problemi', in T. LEINKAUF, T. KISSER (eds.), *Intensität Und Realität: Systematische Analysen Zur Problemgeschichte von Gradualität, Intensität Und Quantitativer Differenz in Ontologie Und Metaphysik*, Berlin-Boston: De Gruyter, 31-50.
- F. FERRARI, (2017) 'La traduzione della lingua filosofica di Platone: alcune riflessioni sul significato di *ousia*', in M. TAUFER (ed.), *Tradurre i classici greci in lingue moderne*, Freiburg: Rombach Verlag.
- G. FIELD, S. HORNBLLOWER, (2016) 'Xenocrates, of Chalcedon, disciple of Plato and head of the Academy, 339 – 314 BCE' *Oxford Classical Dictionary*. <http://oxfordre.com.ezphost.dur.ac.uk/classics/view/10.1093/acrefore/9780199381135.001.0001/acrefore-9780199381135-e-6911>.
- G. FINE, (1984) 'Separation', *Oxford Studies in Ancient Philosophy* 2, 31-87.
- G. FINE, (1993) *On Ideas: Aristotle's criticism of Plato's Theory of Forms*, Oxford: Clarendon Press.
- K. FINE, (1995) 'Ontological dependence', *Proceedings of the Aristotelian Society* 95, 269-290.
- M. FINKELBERG, (2006) 'Aristotle and episodic tragedy', *Greece & Rome* 53, 60-72.
- D. FREDE, (1992) 'Disintegration and restoration: pleasure and pain in Plato's *Philebus*', in R. KRAUT (ed.), *The Cambridge Companion to Plato*, Cambridge: Cambridge University Press, 425-463.
- D. FREDE, (1993) *Plato. Philebus*. Indianapolis-Cambridge: Hackett Publishing Company.
- D. FREDE, (2004) 'On *Generation and Corruption* I.10: On Mixture and Mixables', in F. DE HAAS, J. MANSFELD (eds.), *Aristotle's On Generation and Corruption I*, Oxford: Clarendon Press, 289-314.

- M. **FREDE**, D. **CHARLES** (eds.), (2000) *Aristotle's Metaphysics Lambda. X Symposium Aristotelicum*, Oxford: Oxford University Press
- F. **FRONTEROTTA**, (2001) *METHEXIS. La teoria platonica delle idee e la partecipazione delle cose empiriche. Dai dialoghi giovanili al Parmenide*, Pisa: Scuola Normale Superiore.
- F. **FRONTEROTTA**, (2008) 'Chiusura causale della fisica e razionalità del tutto: alcune opzioni esegetiche sull'efficienza causale delle Idee Platoniche', *Electronic Journal of the International Plato Society* 8, 1-20.
- F. **FRONTEROTTA** (ed.), (2010) *La scienza e le cause a partire dalla Metafisica di Aristotele*. Napoli: Bibliopolis.
- F. **FRONTEROTTA**, (2018) 'Eudoxe et Speusippe sur le Plaisir (selon Aristote): un débat dans l'ancienne Académie', *Revue de philosophie ancienne* 36, 39-72.
- F. **FRONTEROTTA**, W. **LESZL** (eds.), (2011) *Eidos-Idea. Platone, Aristotele e la tradizione Platonica*, Sankt Augustin: Academia Verlag.
- P.P. **FUENTES GONZÁLES**, (2005) 'Ménaichmos', in R. **GOULET**, (ed.), *Dictionnaire des philosophes antiques. IV: de Labeo à Ovidius*, Paris: C.N.R.S Éditions, 401-407.
- K. **GAISER**, (1998) *Testimonia Platonica. Le antiche testimonianze sulle dottrine non scritte di Platone* (transl. In Italian by V. Cicero), Milano: Vita e Pensiero.
- M. **GARRETT**, (2014) *Episodic Poetics: Politics and Literary Form after the constitution*, Oxford: Oxford University Press.
- M.L. **GEMELLI MARCIANO**, (2007) *Democrito e l'Accademia. Studi sulla trasmissione dell'atomismo antico da Aristotele a Simplicio*, Berlin-New York: De Gruyter.
- L.P. **GERSON**, (2013) *From Plato to Platonism*, Ithaca-London: Cornell University Press.
- L.P. **GERSON**, (2016) 'The 'Neoplatonic' Interpretation of Plato's *Parmenides*', *The International Journal of the Platonic Tradition* 10, 65-94.
- A. **GOTTHELF**, J. G. **LENNOX** (eds.), (1987) *Philosophical issues in Aristotle's Biology*, Cambridge: Cambridge University Press.
- J.B. **GOTTSCHALK**, (1986) Review of 'M. **ISNARDI PARENTE**, (1982) *Senocrate-Ermodoro: Frammenti*, Napoli: Bibliopolis', *The Classical Review* 26, 79-81.
- D. **GUTAS**, (2010) *Theophrastus On First Principles (known as his Metaphysics). Greek Text and Medieval Arabic Translation, edited and translated with introduction, commentaries and glossaries, as well as the medieval Latin translation, and with an Excursus on Graeco-Arabic Editorial Technique*, Leiden: Brill.
- W.K.C. **GUTHRIE**, (1978) *The later Plato and the Academy. A History of Greek Philosophy* (vol. V), Cambridge: Cambridge University Press.
- P. **GUYER** (ed.), (2000) *Immanuel Kant: Critique of the Power of Judgment*, trans. P. **GUYER** and E. **MATTHEWS**, Cambridge: Cambridge University Press.
- J. **HALFWASSEN**, (1993) *Der Aufstieg zum Einen: Untersuchungen zu Platon und Plotin*, Stuttgart: Teubner.
- T. **HEATH**, (1921) *A history of Greek mathematics* (2 vols), Oxford: Clarendon Press.

- P.S. **HORKY**, (2013a) *Plato and Pythagoreanism*, Oxford-New York: Oxford University Press.
- P.S. **HORKY**, (2013b) 'Theophrastus on Platonic and 'Pythagorean' imitation', *Classical Quarterly* 63, 686-712.
- P.S. **HORKY**, (2018) 'Speusippus and Xenocrates on the pursuit and ends of philosophy' in H. **TARRANT** F. **RENAUD**, D. **BALTZLY**, D. A. **LAYNE**, *Brill's Companion to the Reception of Plato in Antiquity*, Leiden: Brill, 29-45.
- C. **HORN** (ed.), (2010a) *Aristotle's Metaphysics Lambda – New essays. Proceeding of the 13th conference of the Karl and Gertrud-Abel Foundation. Bonn, November, 28th-December 1st, 2010*, Boston-Berlin: De Gruyter, 269-293.
- C. **HORN**, (2010b) 'The unity of the world-order according to *Metaphysics* $\Lambda 10$ ', in C. **HORN** (ed.), *Aristotle's Metaphysics Lambda – New essays. Proceeding of the 13th conference of the Karl and Gertrud-Abel Foundation. Bonn, November, 28th-December 1st, 2010*, Boston-Berlin: De Gruyter.
- E. **HUSSEY**, (1991) 'Aristotle on Mathematical Objects', *Apeiron* 24, 105-134.
- E. **HUSSEY**, (2004) 'On Generation and Corruption I.8', in F. **DE HAAS**, J. **MANSFELD** (eds.), *Aristotle's On Generation and Corruption I*, Oxford: Clarendon Press, 243-265.
- B. **INWOOD**, (2001) *The Poem of Empedocles*, Toronto: University of Toronto Press.
- M. **ISNARDI PARENTE**, (1969) 'Speusippo in Sesto Empirico, *Adv. Math.* VII, 145-146', *La Parola del Passato* 24, 203-214.
- M. **ISNARDI PARENTE**, (1977) 'Dottrina delle idee e dottrina dei principi nell'Accademia platonica antica', *Annali della Scuola Normale Superiore* 7, 1017-1128.
- M. **ISNARDI PARENTE**, (1979) *Studi sull'Accademia platonica antica*, Firenze: Olschki.
- M. **ISNARDI PARENTE**, (1984a) 'Speusippo in Proclo', *Elenchos* 5, 293-310.
- M. **ISNARDI PARENTE**, (1984b) 'TA META TΑΣ ΙΔΕΑΣ: Figures Idéales ou Première Figures?' in A. **GRAESER** (ed.), *Mathematik und Metaphysik bei Aristoteles: Akten des X. Symposium Aristotelicum, Sigriswil, 6.-12. September*, Berne: P. Haupt, 261-180.
- M. **ISNARDI PARENTE**, (1986) 'L'Accademia Antica: Interpretazioni Recenti e Problemi di Metodo', *Rivista di Filologia e di Istruzione Classica* 114, 350-378.
- M. **ISNARDI PARENTE**, (1992) 'Sesto, Platone, l'Accademia antica e i Pitagorici', *Elenchos* 13, 119-167.
- T.K. **JOHANSEN**, (2009) 'From Plato's *Timaeus* to Aristotle's *De Caelo*: The Case Of The Missing World Soul', in A.C. **BOWEN**, C. **WILDBERG** (eds.), *New Perspectives on Aristotle's De Caelo*, Leiden: Brill, 1-9.
- M.R. **JOHNSON**, (2005) *Aristotle on Teleology*, Oxford: Clarendon Press.
- E. **KAKLAMANO**, (2012) 'Speusippus on cognitive sense perception: Sextus Empiricus *M* 7.145-6', *British Journal for the History of Philosophy* 20, 1183-1193.
- E. **KATZ**, (2013) 'Aristotle's critique of Platonist Mathematical Objects: Two Test Cases from *Metaphysics* M2', *Apeiron* 46, 26-47.
- E. **KATZ**, (2017) 'Ontological separation in Aristotle's *Metaphysics*', *Phronesis* 62, 26-68.

- R. **KLIBANSKY**, C. **LABOWSKY** (eds.), (1953) *Parmenides usque ad finem primae hypothesis nec non Procli commentarium in Parmenides, pars ultima adhuc inedita, interprete Guillelmo de Merbeka*, Vol 3 of *Plato Latinus*, London: Warburg Institute; Leiden: Brill.
- T. **KOUREMENOS**, (1994) 'Posidonius and Geminus on the foundations of mathematics', *Hermes* 122, 437-450.
- H.J. **KRÄMER**, (1961) 'Epekeina tes oysias. Zu Platon, *Politeia* 509b', *Archiv für Geschichte der Philosophie* 50, 1-30.
- H.J. **KRÄMER**, (1964) *Der Ursprung der Geistmetaphysik. Untersuchungen zur Geschichte der Philosophie zwischen Platon und Plotinus*, Amsterdam: Grüner.
- W. **KROLL**, (1892) 'Ein neuplatonischer *Parmenides*-kommentar in einem Turiner Palimpsest', *Rheinisches Museum für Philologie* 47, 599-627.
- A. **LAKS**, (1999) 'Soul, sensation, and thought' in A.A. **LONG**, *The Cambridge Companion to Early Greek Philosophy*, Cambridge: Cambridge University Press, 250-270.
- D. **LANZA**, (1966) *Anassagora. Testimonianze e Frammenti*, Firenze: La Nuova Italia Editrice.
- F. **LASSERRE** (ed.), (1987) *De Léodamas de Thasos à Philippe d'Oponthe: témoignages et fragments, édit., trad. et comm., coll. «La Scuola di Platone » 2, p. 117-124 (Ménechme n° 12, Testimonia [T], Fragmenta [F], Doctrina [D])*, Napoli: Bibliopolis, p. 329-336 (trad.), p. 545-559 (comm.).
- D. **LEFEBVRE**, (2016) 'Le *sperma*: forme, matière ou les deux?' *Philosophie antique* 16, 31-62.
- J. G. **LENNOX**, (2001) *Aristotle's Philosophy of Biology: Studies in the Origins of Life Science*, Cambridge: Cambridge University Press.
- M. **LEUNISSEN**, (2010) *Explanation and Teleology in Aristotle's science of nature*, Cambridge: Cambridge University Press.
- F.A. **LEWIS**, (2013) *How Aristotle gets by in Metaphysics Zeta*, Oxford: Oxford University Press.
- G.E.R. **LLOYD**, (1966) *Polarity and analogy. Two types of argumentation in early Greek thought*, Cambridge: Cambridge University Press.
- C. **LUNA**, (2001) 'Étude III: Alexandre d'Aphrodisie et Syrianus comme sources du commentaire d'Asclépius', in *Trois études sur la tradition des commentaires anciens à la Métaphysique*, Leiden-Boston-Köln: Brill, 99-186.
- S. **MAKIN**, (2003) 'What does Aristotle mean by Priority in Substance?' *Oxford Studies in Ancient Philosophy* 24, 209-38.
- M. **MALINK**, (2017) 'Aristotle on principles as elements', *Oxford Studies in Ancient Philosophy* 53, 163-213.
- J. **MANSFELD**, (1990) *Studies in the historiography of Greek philosophy*, Maastricht: Van Gorcum.
- D.G. **MCISAAC**, (2014) 'Geometrical First Principles in Proclus' *Commentary on the First Book of Euclid's Elements*', *Phronesis* 59, 44-98.
- S. **MENN**, (unpublished) *The Aim and the Argument of Aristotle's Metaphysics*.
- S. **MENN**, (unpublished, IIa) 'The plan of Z and the questions of Z1-3' in S. **MENN**, (unpublished) *The Aim and the Argument of Aristotle's Metaphysics*, 1-27.

- S. MENN, (unpublished, I β 4) ‘The question of separation’, in S. MENN, (unpublished) *The Aim and the Argument of Aristotle’s Metaphysics*, 1-37.
- S. MENN, (unpublished, I γ 3) ‘The argument-structure of MN and their place in the Metaphysics’ in S. MENN, (unpublished) *The Aim and the Argument of Aristotle’s Metaphysics*, 1-71.
- S. MENN, (2001) ‘Metaphysics Z 10-16 and the argument-structure of *Metaphysics Z*’, *Oxford Studies in Ancient Philosophy* 21: 83-134.
- S. MENN, (2011) ‘On Myles Burnyeat’s *Map of Metaphysics Zeta*’, *Ancient Philosophy* 31, 161-202.
- S. MENN, (2012) ‘Critique of earlier philosophers on the Good and the causes’, in C. STEEL (ed.), *Aristotle’s Metaphysics Alpha*, Oxford: Oxford University Press, 201-224.
- P. MERLAN, (1953) *From Platonism to Neoplatonism*, The Hague: Nijhoff.
- A. METRY, (2002) *Speusippos. Zahl – Erkenntnis – Sein*, Bern: P.Haupt.
- J. MITTELMANN, (2010) ‘A Bug’s Life. Aristotle’s Metaphysics of Divided Insects’, *The new Centennial Review* 10, 79-104.
- G.R. MORROW, (1970) *Proclus: A Commentary of the First Book of Euclid’s Elements*. Princeton: Princeton University Press.
- A. MOTTE, P. SOMVILLE (eds.), (2008) *Ousia dans la philosophie grecque des origins à Aristote*, Louvain-la Neuve: Éditions Peeters.
- I. MUELLER, (1979) ‘Aristotle on geometrical objects’, *Archiv für Geschichte der Philosophie* 52, 156-171.
- I. MUELLER, (1986) ‘On some Academic theories of mathematical objects’, *JHS* 106, 111-120.
- R.G. MULGAN, (1974) ‘A note on Aristotle’s absolute ruler’, *Phronesis* 19, 66-69.
- C. MURGIER, (2016) ‘Polemical arguments about pleasures: the controversy within and around the Academy’ in S. WEISSER, N. THALER, *Strategies of polemics in Greek and Roman philosophy*, Leiden-Boston: Brill, 71-92.
- L. NAPOLITANO-VALDITARA, (1988) *Le idee, i numeri, l’ordine. La dottrina della mathesis universalis dall’Accademia antica al neoplatonismo*, Napoli: Bibliopolis.
- A. ORTONY, (1979) ‘Beyond literal similarity’, *Psychological Review* 86, 161-180.
- I. PAJÓN LEYRA, (2013) ‘The *Aristotelian corpus* and the Rhodian tradition: new light from Posidonius on the transmission of Aristotle’s works’, *Classical Quarterly* 63, 722-733.
- A.L. PECK, (1970) ‘Appendix A: The risings and settings of the stars’, A. L. Peck (trad.), *Aristotle: History of Animals* (vol. 2), Cambridge, Massachusetts: Harvard University Press, 383-408.
- M. PERAMATZIS, (2011) *Priority in Aristotle’s Metaphysics*, Oxford: Oxford University Press.
- D. PESCE, (1961) *Idea, numero ed anima. Primi contributi ad una storia del platonismo nell’antichità*, Padova: Libreria Gregoriana editrice.
- F.M. PETRUCCI, (2012) *Teone di Smirne. Expositio rerum mathematicarum ad legendum Platonem utilium* (introduzione, traduzione, commento), Sankt Augustin: Academia Verlag.

- F.M. **PETRUCCI**, (2018) *Taurus of Beirut. The other side of Middle Platonism*, London-New York, Routledge.
- S. **PINES**, (1961) 'A New fragment of Xenocrates and Its Implications', *Transactions of the American Philosophical Society* 51, 3-34.
- R. **POLANSKY**, (2007) *Aristotle's De Anima*, Cambridge: Cambridge University Press.
- V. **POLITIS**, (2006) 'Ἀπορία and searching in the early Plato' in L. **JUDSON**, L. and V. **KARASMANIS** (eds.), *Remembering Socrates*, Oxford: Oxford University Press, 88–109.
- D. **QUARANTOTTO**, (2001) 'Ontologia della causa finale aristotelica', *Elenchos* 12, 329-365.
- D. **QUARANTOTTO**, (2005) *Causa Finale, Sostanza, Essenza in Aristotele: saggio sulla struttura dei processi teleologici naturali e sulla funzione del telos*. Napoli: Bibliopolis.
- M. **RASHED**, (2004) 'Priorité de l'ΕΙΔΟΣ ou du ΓΕΝΟΣ entre Andronicos et Alexandre: Vestiges Arabes et Grecs Inédits', *Arabic Sciences and Philosophy* 14, 9-63.
- M. **RASHED**, (2013) 'Plato's Five Worlds Hypothesis (Ti. 55cd). Mathematical and Universals' in R. **CHIARADONNA**, G. **GALLUZZO** (eds.), *Universals in Ancient Philosophy*, Pisa: Edizioni della Normale, 87-112.
- M. **RASHED**, (2013b) 'Platon et les mathématiques' in A. **CASTEL-BOUCHOUCHI**, M. **DIXSAUT**, G. **KÉVORKIAN** (eds.), *Lectures de Platon*, Paris: Ellipses, 215-232.
- M. **RASHED**, D. **O'BRIEN**, (2001) 'Empédocle, fragment 32 Diels (Pseudo-Aristote, 'De Lineis inseparabilibus, 972b 29-31), *Revue des Études Grecques* 114, 349-358.
- G. **REALE**, (2008) *Il concetto di 'filosofia prima' e l'unità della metafisica di Aristotele*, Milano: Bompiani.
- D.A. **REES**, (1957) 'Bipartition of the Soul in the Early Academy', *JHS* 77, 112-118.
- D. J. **RIESBECK**, (2016) *Aristotle on Political Community*, Cambridge: Cambridge University Press.
- L. **ROBIN**, (1908) *La Théorie platonicienne des idées et des nombres d'après Aristote: Étude historique et critique*, Paris (repr. Hildesheim, 1963).
- H.D. **SAFFREY**, (1971) *Le ΠΕΡΙ ΦΙΛΟΣΟΦΙΑΣ d'Aristote et la théorie platonicienne des idées nombres*, Leiden: Brill.
- N. **SANTAMARIA**, G. **BELLO**, A. **CORRIERO**, M. **DEFLORIO**, R. **VASSALLO-AGIUS**, T. **BÖK** and G. **De METRIO**, (2009) 'Age and growth of Atlantic bluefin tuna, *Thunnus thynnus* (Osteichthyes: Thunnidae) in the Mediterranean Sea, *J. Appl. Ichtyol.* 25, 38-45.
- B. **SATTLER**, (2012) 'A likely Account of Necessity: Plato's Receptacle as a Physical and Metaphysical Foundation for Space', *Journal of the History of Philosophy* 50, 159-195.
- H.S. **SCHIBLI**, (1993) 'Xenocrates' Daemons and the Irrational Soul', *Classical Quarterly* 43, 143-167.
- M. **SCHOFIELD**, (1971) 'Who were οι δυσχερεῖς in Plato, *Philebus* 44a ff.?' *Museum Helveticum* 28, 2-20.
- M. **SCHOFIELD**, (2004) 'Likeness and likenesses in the *Parmenides*', in C. **GILL**, M. M. **MCCABE** (eds.), *Form and argument in late Plato*, Oxford University Press, 49-77.

- D. **SEDLEY**, (2006) 'Forms-Particular resemblance in Plato's *Phaedo*', *Proceedings of the Aristotelian Society* 106, 311-327.
- D. **SEDLEY**, (2009) 'Atomism's Eleatic roots', in P. **CURD**, D. W. **GRAHAM**, *The Oxford Handbook of Presocratic Philosophy*, Oxford: Oxford University Press, 305-332.
- D. **SEDLEY** (ed.), (2012) *The philosophy of Antiochus*, Cambridge: Cambridge University Press.
- D. **SEDLEY**, (forthcoming), 'Xenocrates' invention of Platonism', in M. **ERLER**, J. **HESSLER**, F. **PETRUCCI** (eds.), *Authorities and Authoritative Texts in the Platonist Tradition*, Cambridge: Cambridge University Press, 0000.
- F. **SHEFFIELD**, (2010) 'Aristotle and Plato's *Symposium*', *Bulletin of the Institute of Classical Studies. Supplement n. 107, Aristotle and the Stoics reading Plato*, 123-141.
- H.W. **SMYTH**, (1956) *Greek Grammar*, Cambridge, MA: Harvard University Press.
- F. **SOLMSEN**, (1960) *Aristotle's System of the Physical World: A Comparison with His Predecessors*, Ithaca-New York: Cornell University Press.
- R.K. **SPRAGUE**, (1989) 'Aristotle and Divided Insects', *Méthexis* 2, 29-40.
- C. **STEEL**, (2002) 'A Neoplatonic Speusippus', in G. **BARBANTI**, G.R. **GIARDINA**, P. **MANGANARO** (eds.), *Hénos kai philís = Unione e Amicizia: omaggio a Francesco Romano*, 469-476.
- J. **STENZEL**, (1929) 'Speusippos', *Real-Encyclopädie III A 2*, coll.1636-1669.
- L. **TARÁN**, (1969) 'Asclepius of Tralles: *Commentary to Nicomachus' Introduction to arithmetic*', *Transactions of the American Philosophical Society* 59, 1-89.
- L. **TARÁN**, (1991) 'Ideas, numbers, and magnitudes: remarks on Plato, Speusippus, and Aristotle', *Revue de Philosophie Ancienne* 9, 199-231.
- L. **TARÁN**, (2001) 'Proclus and the Old Academy', in L. **TARÁN**, *Collected papers (1962-1999)*, Leiden-Boston-Köln: Brill, 564-622.
- P. **TARANTINO**, (2010) 'La distinzione tra "problemi" e "teoremi" nel dibattito tra i matematici dell'Accademia', *Nova Tellus* 28, 97-123.
- H. **TARRANT**, (1974) 'Speusippus' ontological classification', *Phronesis* 19, 130-145.
- H. **TARRANT**, (2008) 'The *Dyschereis* of the *Magna Moralia*', *The internet journal of the International Plato Society* 8, 1-15.
- H. **TARRANT**, (2010) 'A taste of the Doctrines of each group of Sages': Plato's Midwifery at work in the Academy' in J. **DILLON**, L. **BRISSON** (eds.) *Plato's Philebus. Selected papers from the eight Symposium Platonicum*, Sankt Augustin: Academia Verlag, 110-119.
- D. **THIEL**, (2006) *Die Philosophie des Xenokrates im Kontext der Alten Akademie*, Munich and Leipzig: K.G. Saur.
- R.B. **TODD**, (1996) *Themistius: On Aristotle's On the Soul*, Ithaca, Cornell University Press.
- F. **TRABATTONI**, (2003) 'Aristotele. *Etica Eudemia A 8*', *Elenchos* 24, 279-309.
- F. **TRABATTONI**, (2017) 'L'Accademia Antica' in **TRABATTONI**, F. (ed.), *Storia della Filosofia Antica II. Platone e Aristotele*, Roma: Carocci, 143-164.

- M. **VAN RAALTE**, (1988) 'The idea of the cosmos as an organic whole in Theophrastus', in W. W. **FORTENBAUGH** and R. W. **SHARPLES** (eds.), *Theophrastean Studies*, New Brunswick-Oxford: Transaction Publishers, 189-215.
- G. **VAN RIEL**, (2008) 'Philèbe', in A. MOTTE - P. SOMVILLE (eds.), *Ousia dans la philosophie grecque des origins à Aristote*, Louvain-la Neuve: Éditions Peeters, 165-174.
- F. **VERDE**, (2012) *Elachista. La dottrina dei minimi nell'Epicureismo*, Leuven: Leuven University Press.
- B. **VITRAC**, (2005) 'Les classifications des sciences mathématiques en Grèce ancienne' *Archives de philosophie* 68, 269-301.
- K. **VON FRITZ**, (1938) *Philosophie und sprachlicher Ausdruck bei Demokrit, Plato und Aristoteles*, New York: Darmstadt.
- J. **VUILLEMIN**, (2001) *Mathématiques platoniciennes et pythagoriciennes*, Paris: Blanchard.
- J. **WARREN**, (2009) 'Aristotle on Speusippus on Eudoxus', *Oxford Studies in Ancient Philosophy* 36, 249-281.
- J.C. **WILSON**, (1904) 'On the Platonist doctrine of the ἀσύμβλητοι ἀριθμοί' *The Classical Review* 18, 247-260.
- J. **WINZENRIETH**, (2018) 'Après les nombres, après les idées: le statut des grandeurs au sein du Platonisme' *Les Études philosophiques* 18, 67-90.
- C. **WITT**, (1989) *Substance and essence in Aristotle: an interpretation of Metaphysics VII-IX*, Ithaca: Cornell University Press.
- C. **WITT**, (1994) 'The priority of Actuality', in T. **SCALTSAS**, D. **CHARLES** and M. L. **GILL** (eds.) *Unity, Identity and Explanation in Aristotle's 'Metaphysics'*, Oxford: Oxford University Press, 215-228.
- C. **WITT**, (2003) *Ways of Being: Potentiality and Actuality in Aristotle's Metaphysics*, Ithaca: Cornell University Press.
- E. **ZELLER**, R. **MONDOLFO**, (1974) *La filosofia dei Greci nel suo sviluppo storico* (3 vols). Firenze: La Nuova Italia Editrice.
- L. **ZHMUD**, (1998) 'Plato as 'Architect of Science'', *Phronesis* 43, 211-244.
- L. **ZHMUD**, (2006) *The origin of the history of science in classical antiquity*, Berlin: De Gruyter.
- L. **ZHMUD**, (2016) 'Greek Arithmology: Pythagoras or Plato?' in A.-B. **RENGER**, A. **STAVRU** (eds.), *Pythagorean Knowledge from the Ancient to the Modern World: Askesis, Religion, Science*, Wiesbaden: Harrassowitz Verlag, 321-346.
- L. **ZHMUD**, (2018) 'Ancient Greek *mathēmata* from a sociological perspective: a quantitative analysis', *Isis* 109, 445-472.
- M. **ZINGANO**, (2010) 'Individuals, form, movement: from Lambda to Z-H', in C. **HORN**, *Aristotle's Metaphysics Lambda – New essays. Proceeding of the 13th conference of the Karl and Gertrud-Abel Foundation. Bonn, November, 28th-December 1st, 2010*, Boston-Berlin: De Gruyter, 139-156.